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Papercut's

Internet Security

USER MANUAL

Viruses, malware, ransomware, phishing, smishing, vishing, social engineering... the list of digital threats with peculiar names expands daily and hardly a moment goes by without some form of attack appearing in the news. We live in interesting times, where data is worth more than oil or gold and your personal information is greatly sought after by cybercriminals, scammers and hackers. How prepared are you for this new age of digital vandalism and theft? Is your Windows computer secure against the continual onslaught of the modern online world? We'll help you secure your computer, network and devices against such threats and with easy to follow tutorials, help arm you against potential threats and attacks. For parents and guardians, we also cover looking out for your children when online, together with guides on how best to protect them and advice from industry experts. You'll soon be security savvy and prepared for whatever digital threat looms on the horizon.

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STOP

Information regarding cyber security doesn't always have to be technically heavy. In fact, to make it easier to digest, and to just show you how virulent and bitterly hostile computer-borne security threats are, here's a collection of statistics to give you the heebie-jeebies; all the more reason then to keep this manual close to hand.

80% of all cyber crime attacks originate from Russia, China and North Korea

77% of small businesses **don't** regularly back up important data

75% of the health care industry has been infected with malware.*

73% of US citizens have fallen victim to some form of cyber crime

64% of companies have experienced web-based attacks

61% of malicious websites are genuine sites that have been compromised

Over the next year there is a 69% CHANCE you could be HACKED!

Social Media Users

50%

*****_

Haven't changed their password in the *last year*

20%

*****_

Have *never* changed their password

Sources: Symantec Corporation Threat Report • CSO Cybersecurity Business Report • UK National Cyber Security Centre • Security Intelligence • Hackmageddon.com • UK Office for National Statistics • Bitdefender Labs Report • Herjavec Group

* Figures based on 2017 half yearly report.

A member of the public is **HACKED** every:

39 SECONDS

Devices hacked in **LESS THAN:**

2 MINUTES

RANSOMWARE ATTACKS on BUSINESS every:

40 SECONDS

GLOBALLY: COST PER PERSON **6 MONTHS***

$123 FIXING Malware ATTACKS

$441 LOST to Cyber CRIME

$271 PAYING RANSOMS to remove malware

250,000 NEW VIRUS threats **EVERY DAY**

OVER **3,000,000** REPORTED INSTANCES OF **FRAUD** through **cybercrime** against **UK banks** last year

Statista.com • iQuda.co.uk • Tektonika • Securityaffairs.com • Ic3.gov • Marblesecurity.com • Infosec Institute • IBM • The Linux Foundation • Microsoft • ITworld.com • Javelin Strategy • US Government • NSA.gov • CIA.gov • Whitehouse.gov

Modern Day Security

The start of the digital age brought with it many advances in the way we work and interact with each other. It's estimated there's 1.2 Zettabytes (1.3 trillion gigabytes) of data available to someone with access to the Internet and whilst most of it may be irrelevant, what's important to you is somewhere within that mass of raw information.

Sadly, the cold hard light of day reveals that with the growth of this voluminous data comes the nefarious acts of those who wish to cause mayhem, panic, theft and other such negative elements. Therefore, as a user you need to make sure that you're protected against the ever increasing digital world of threats, viruses and everything else the Internet has to offer.

This chapter will help you to recognise some of the threats, what they all mean and how they work. We can help you to identify and know what to look out for when online.

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Types of Security Risk

There are more security risks for your computer than just the common, run-of-the-mill virus. The amount of digital use the average person has over the course of a week has increased significantly in just a few years, and with it comes a legion of security related issues.

Here Be Dragons

This isn't a definitive list of the possible threats available for the Windows user but here are ten modern risks that you face every time you power up your PC.

01 Viruses

Viruses have been around for as long as computers. They've moved on from simply displaying the name of the coder on the monitor, a kind of virtual vandalism, and now can disable and wipe the data off a hard drive in mere seconds.

02 Ransomware

Earlier in the year the UK was gripped in the clutches of the WannaCry ransomware infection. This particular infection exploited a vulnerability in Windows, and quickly spread throughout the NHS and other organisations, locking and encrypting the data on a computer until money was sent to those who unleashed it to the world.

03 Worms

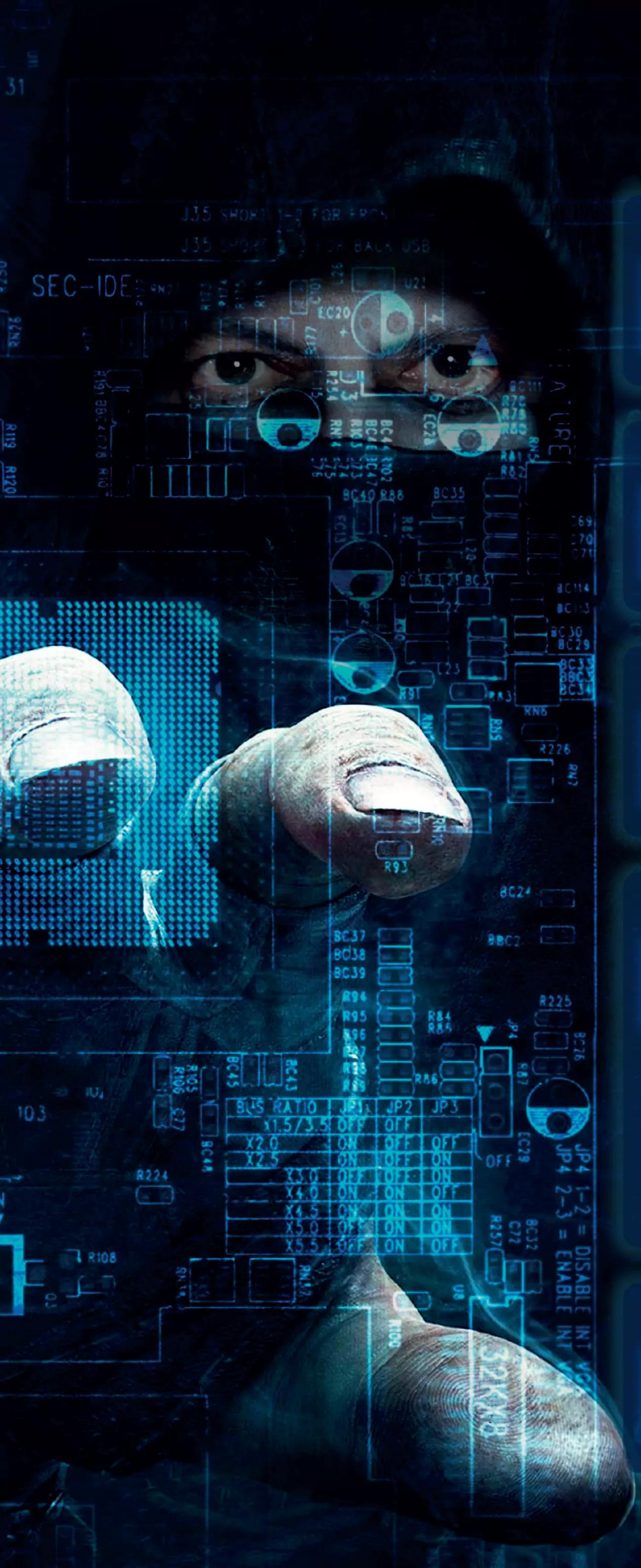
Although a worm is a type of virus, it behaves differently in that it's goal isn't to alter or destroy system files. Rather, it's designed to replicate itself continuously until all the resources and space on the system are consumed. A bit of a nightmare for the system administrator.

04 Trojans

The Trojan horse, as the name suggests, is a program that masquerades as a legitimate application but in actual fact contains code that allows a hacker remote access to your computer. Like the legend of the wooden horse the Greeks used to gain access to Troy, once inside your computer it opens and creates an opening for the hacker.

05 Spyware

Spyware invades computers usually through freeware or shareware downloads, which is why you should always download a program from a reputable source. The intent of spyware is to collect information about the user and report it back to those who wrote it.



06 Adware

Adware is very similar to spyware, in that one of its goals is to monitor the user. However, adware usually goes one step further and bombards the user with Internet pop-up advertising, usually when they open their browser or a new tab. The advertising can be tame, such as gardening equipment, or it can be extremely offensive.

07 Hacking

While Hollywood would have you visualise the lifestyle of a hacker as something that's quite alluring, in truth it's quite the opposite. The average user is generally under the radar where a hacker is concerned. They're mostly after the corporations, or famous people, but you can have your computer hacked by a neighbour, for example.

08 Social Engineering

A relatively modern term in the history of computer security, social engineering will have the user deceived into giving away personal information or allowing a scammer into their systems. The recent spate of calls from people claiming to be from the likes of Microsoft or a security firm are a prime example.

09 Phishing

Much in the same vein as social engineering, phishing is the act of obtaining sensitive information (bank details usually) about a user by being disguised as a trustworthy source. Phishing on social media sites such as Facebook, Twitter, etc. is on the rise.

10 Rootkits

Rootkits are virus-like programs that are activated before the computer's anti-virus and security suites are started when booting Windows. They can change the way a security suite looks at files, allowing a virus to hide in plain sight and not be detected by the system's security measures.

Hackers and You

We're probably all familiar with the term 'hacker', and what it suggests, but do we really know what a hacker wants from us? More to the point, how are we perceived in the eyes of a hacker? Let's have a look at what the modern hacker wants from the average user.

Being on the end of a successful hack has been likened to having your house robbed. There's a

> **"You've been hacked!"**

feeling of invasion, that someone has rifled through your personal belongings and stolen what's yours.

WARNING

Monetary Motivation

As with most hacks the world over, money is the driving force behind an attack. A hacker will want to enter your system through various means and obtain your bank or credit card details in order to get access to your money. It's plain and simple theft.

Personal Information

Personal information can be extremely valuable to a hacker. Those who manage to obtain information about you, from date of birth, address, social security number and countless other trivial details, can then use your identity to open bank accounts, start a loan and so on. In the end, it is your name that's linked to the fraud.

Parasitic Infection

Sometimes a hacker will use you to get some other target. Perhaps you work at a bank, or something similar, the hacker will then identify you as a target that can be used to transfer a program from your laptop to the work's server. You unwittingly become the carrier of malware, allowing a hacker to gain access to your work.

Exploitation

Exploitation is becoming a common theme among modern hackers. In this scenario a hacker will gain access to your personal information and hold it to ransom. They can then demand anything from money, to more personal acts.

Stealing Bandwidth

Rather than targeting a user purely for financial gain, or something else, a hacker can also want to use your home bandwidth. Generally speaking, the hacker doesn't need to be on the other side of the world, they could be a neighbour who's using your Internet connection to download copyright material.

Access to Your Webcam

Webcam hacking has become more popular in recent years. What happens here is, a hacker manages to gain access to your computer and activates the webcam in order to view what you're doing; and as long as the computer is up and running, they can see everything the webcam can, and they can do so without you even knowing.

Access to Your Microphone

To expand on the previous hack, along with a webcam hack an attacker can also activate a computer or device's microphone. Doing so will allow them to listen in on anything that's being said, so perhaps it's worth covering up your microphone during any future meetings.

Zombie Apocalypse

There are instances whereby you become the target of a larger scale hack. In this case the hacker isn't targeting you specifically, they're simply using your computer as a zombie, a collection of machines connected to the Internet that runs malicious programs against a target. Zombies are often used to conduct DDoS attacks.

Cyber Vandalism

Often you can be the target of an attack that doesn't seem to make any sense. The hacker doesn't want money, they don't want your personal information either. It's just a case of cyber vandalism. Perhaps the hacker wants their name known in the wider world, or just likes to see chaos reign. Who knows why they do it?

Distributing Illegal Material

Finally, a hacker can use your computer as a source or a node for the distribution of illegal material. You won't even be aware of the fact but your computer is successfully trafficking illegal material together with others on the Internet.

Social Engineering

With the rise of wider forms of communication, through social media and so on, comes a new wave of threats called social engineering. There are many forms of social engineering, so let's have a look at what you're up against, and how to combat it.

Social engineering is the new modern way of manipulating people to give up their personal and confidential information. It comes in many guises and under different sub-headings, such as Phishing and the like, but it's essentially all a form of social engineering. Essentially, the scammer will take your human nature and responses and turn it against you for their own gain.

The kind of information the scammer is after does vary, depending on the type of scam being used, but for the most part they're usually after your passwords, bank and credit card details, or login information in order to gain any sort of financial data.

You're probably more familiar with social engineering that you suspect, even if you're new to the term. Recall the emails from someone, usually based in Nigeria, who has come into a fortune in the billions and for some inexplicable reason wants to put the money in your bank account. Needless to say, the money was never there in the first place and should you go through the process you will eventually be persuaded to hand over some banking information which the scammer can then use to steal from you.

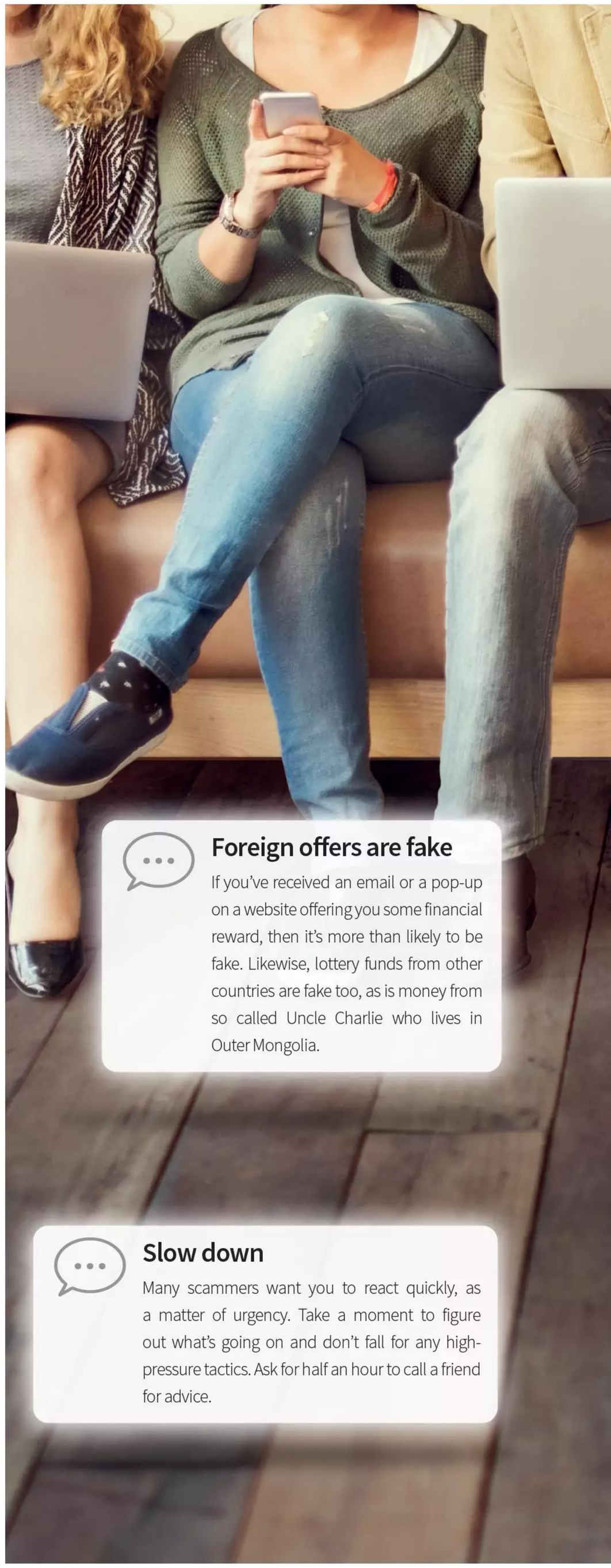
There aren't too many Nigerian scams these days, mostly you get a phone call from someone claiming to be from Microsoft or some other well-known company, who insists that they are tracking a virus or other harmful malware that's currently residing on your computer. They ask you to visit a webpage and download a piece of software that will allow them remote access to your computer. When in, they run a script that displays a wealth of useless information on the screen whilst in the background they run keylogging and hacking software to obtain your online banking details. They can even ask you to log into your bank while connected to make sure everything is working.

Other common social engineering tactics include emails from a friend, who has been hacked, with the scammer masquerading as them. It could be an email claiming to be from your bank, an urgent request for help or someone asking for a donation to a charitable organisation. Be wary, and question everything.

You may think you're not the sort of person to be fooled by a scam but often the

> **Scam, scam, and more scam**

scammers have employed subtle ways and means in which to bait you.



Foreign offers are fake

If you've received an email or a pop-up on a website offering you some financial reward, then it's more than likely to be fake. Likewise, lottery funds from other countries are fake too, as is money from so called Uncle Charlie who lives in Outer Mongolia.

Slow down

Many scammers want you to react quickly, as a matter of urgency. Take a moment to figure out what's going on and don't fall for any high-pressure tactics. Ask for half an hour to call a friend for advice.

Research everything

Locate your bank or credit card company's webpage and follow any links to known social engineering scams. Read all the information you can gather about the techniques and tricks used and arm yourself with that knowledge prior to any contact from a scammer. The more you know, the less likely you are to being hoodwinked.

Don't engage

Whilst it's fun to lead a scammer on the other end of the telephone, telling them that the only computer you own is a Commodore 64, it's really not worth it. They know they're scamming, you know they're scamming, so just put the phone down and ignore them.

Beware of attachments

Email attachments are an excellent way of distributing malware, viruses and hacking scripts to your computer. If you receive an email claiming to be offering you a deal of a lifetime, and requesting you open the attached file, then it's likely a virus. Research the sender, and best to delete the email.

Never give your password

A bank never asks you for your password, they never call you up or send a text message requesting to enter your password, nor will they ask you for other personal information relating to your account. Treat all requests as suspect and don't give out any of your passwords.

Ransomware: How it Works

The first instance of an extortion attack is credited to Joseph Popp back in 1989. Since then the frequency, delivery and scale of ransomware attacks has increased significantly; so what is ransomware and how does it work?

Ransomware is a particularly nasty form of malware and digital threat. There's usually some kind of ransomware headlining in the news around the world and those who are the victims are often at a loss as to what to do next.

Essentially, ransomware will infect an individual computer and one of two things can happen: first, it locks the computer, stopping all access to it from the keyboard, then it starts to search for data and encrypt the contents of the hard drive. Lastly it infects the boot sector of the computer and displays a message detailing the type of ransomware and how the individual will pay for the release of the data; the message can even have fake FBI warnings included with it. Alternatively, and the second thing that may happen once a system is infected, the ransomware will lay in wait until a set time and date, then do all of the above and lock the computer. Waiting for a set time will ensure that numerous machines are infected before any fix can be discovered; also if all the infected machines are activated at the same time then there's more of a chance of the attacker getting their ransom paid.

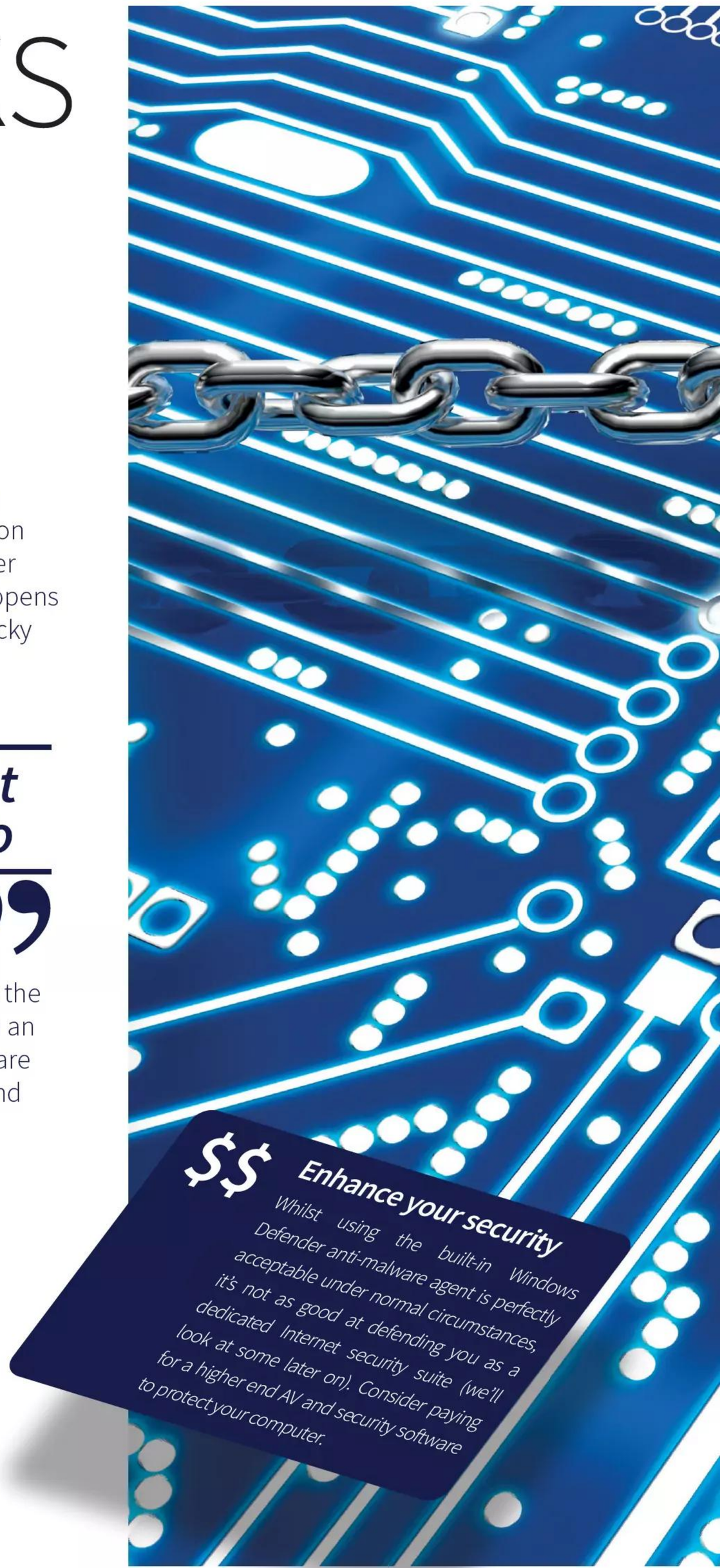
You normally have a set time in which to pay the ransom, usually 72-hours. If the victim doesn't pay in time, the attacker can introduce a second phase into the ransomware code that will either increase the amount demanded or completely destroy the files that are being held at ransom.

Ransomware can be spread in a number of ways. The more popular choice of delivery is via an infected web page, some form of Flash script that has been hijacked and now contains a link to a remote server where the browser will unwittingly download the ransomware code. More recently there are instances of Drive-by attacks, where the ransomware code locates any USB sticks a user may have in their system and transfer itself in the knowledge that the stick will be inserted into a work's computer.

The WannaCry ransomware attack earlier in the year was by far one of the most prevalent in recent years. It's estimated that more than 250,000 computers across 200 countries were infected, rendering the likes of big companies such as FedEx, Nissan Motor Co and Telefonica SA under siege from its demands. The National Health Service in the UK was hit too, resulting in weeks of chaos and disorder for the staff and patients alike.

How do you avoid getting ransomware on your computer and what happens if you're unlucky enough to be the target of such an attack? Here are some hints and tips for you.

> ***What to do***



$$ Updates

The single most important factor of preventing a ransomware attack is to make sure that your computer has the latest updates applied. Ransomware code usually looks for vulnerabilities and weaknesses in the operating system but if they're up to date and patched, then it's difficult for it to activate.

$$ Never insert a random USB stick

If you've found a USB stick somewhere, although the temptation is strong to see what's on it, don't stick in your computer. Not only could it be infected with all sorts of malware, it could also contain sensitive and confidential data. Either destroy it or hand it over to a security expert at work.

$$ Never pay

Your data is locked, and there's nothing that can be done by anyone to save it, so it's really not recommended to pay the ransom. Nine times out of ten, the attacker will take the money and never unlock the data anyway. There's also the threat of more malware being activated after payment.

$$ Backup

Set yourself a daily backup schedule, to a USB, cloud or network resource that's separate from your computer. If your data is securely backed up, and you get a ransomware attack, then you can happily wipe your computer, re-install Windows again, then copy the saved data back over.

The Virus Top Ten

Viruses are constantly evolving thanks to more ingenious methods of delivery and due to the developers and hackers tweaking their code to sniff out operating system vulnerabilities. It's difficult to say what the next big virus will be but some scary ones have already appeared on the Internet.

Just to give you an idea of what the future could hold for the computing world,

> *"Digital Destruction"*

here are the top ten most destructive viruses unleashed over the last decade into the digital domain.

1 Storm Worm

Storm Worm was released in 2007 and was rumoured to have hailed from Russia. It came in the form of an email link, usually with an important headline to grab the victim's attention. When the victim clicks the link the code is inserted and payload with a backdoor into the system is opened. It infected over 10 million computers worldwide.

2 Conficker

Conficker was a 2008 worm that infected an estimated 15 million Windows computers worldwide. The French Navy, UK Ministry of Defence, hospitals and local police forces were affected. It was spread via Facebook, Skype and mail services, and infected networked computers with a keylogger that the hacker could use to record your keyboard strokes.

3 Daprosy Worm

2009 saw the release of the Daprosy Worm whereby an estimated 20 million computers were infected with a keylogger. What made this such a dangerous virus was that it remained active in Windows Safe Mode, so it was very difficult to remove.

4 Stuxnet

Stuxnet was rumoured to have been a US Intelligence created virus that was designed to infect Iranian nuclear power plants, thus stopping them from potentially creating weapons grade material. Whether you believe that or not, it was one of the worst viruses to appear in modern times.

5 Duqu

Duqu was released in 2011 and shared many characteristics with Stuxnet. However, Duqu had different roles: it would work as a keylogger, to steal digital certificates, gather information about an infected PC, or completely wipe the contents of any connected hard drives. Interestingly, parts of the Duqu code were written in an unknown high level programming language.

6 Shamoon

Shamoon was discovered in 2012 and developed to infect the Windows kernel, the core code of the operating system. It successfully managed to wipe the contents of millions of hard drives and was rumoured to be used in cyber espionage in the energy industry.

7 CryptoLocker

CryptoLocker is a ransomware infection that first appeared in 2013. As with most ransomware code it locks and encrypts your entire hard drive and offers to unlock them if the victim pays up to $300. Remarkably, the code was able to delete itself whilst still keeping the files encrypted and locked.

8 Regin

2014's Regin virus was spread via fake websites and infected tens of millions of computers. Rumour has it that it was a joint US and UK intelligence created virus for global digital surveillance but we'll leave that for the conspiracy theorists to argue over. Nevertheless, it managed to send information of the victim's computer back to an unknown location.

9 Rombertik's Endless Loop

Rombertik's Endless Loop is an interesting, if somewhat deadly, virus to have sprung up in 2015. When infected, the virus will alter and delete key boot files for Windows computers then force them to reboot. With the boot files missing or altered the Windows PC will continually boot and reboot itself until you re-install the OS.

10 Tiny Banker

Tiny Banker is an information and packet sniffer virus that will record any online banking details the victim enters in their computer. That information is then sent back to several servers which the hackers can then use to access your bank accounts. It's estimated that hundreds of millions were stolen in 2016 thanks to Tiny Banker.

Phishing,

It's tempting to think we've made up the words Phishing, Vishing and Smishing but in actual fact they're all forms of social engineering scams. Whilst we've covered social engineering already, it's worth looking at these three modern day threats individually.

Social engineering, the act of getting information from a person based on their human instinct to react, help or be entrapped into some form of false promise, isn't as modern as the name suggests. Although the term 'social engineering' is in fact relatively new, the process of obtaining sensitive information from a victim has been around for a very long time.

The digital age, of course, has increased the attacks and how they're delivered. No longer is a victim beguiled by post, now they're bombarded by false websites, emails and a string of other cleverly disguised mediums.

Let's break down the three main, modern methods of how a scammer will attempt to obtain your personal and sensitive information: Phishing, Vishing and Smishing.

Social engineering fraud comes in many guises, with oddly sounding names and methods. In the end, the scammers are after your data, but what do these three in particular mean?

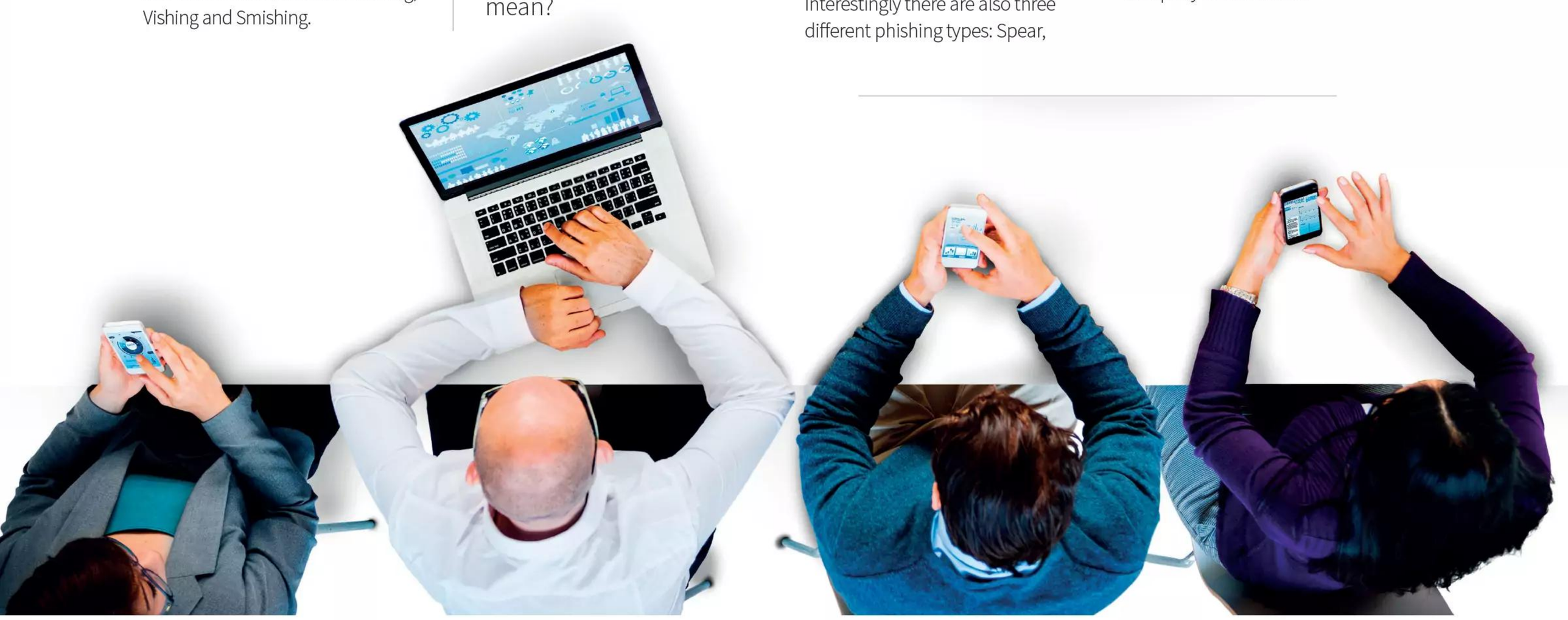
> "Gone Phishing"

Phishing is the attempt to obtain information from a potential victim through emails, messaging, social media and auction sites. They can come in the form of an email, for example, claiming to have some money available for you or pretending to be from your bank or credit card company. Social media phishing includes individuals befriending you, or pretending to be someone you may know, then asking for information. Similarly a phishing attack can come in the form of a Facebook seemingly friendly test, such as 'name the top five things about yourself and tag ten friends…'. The unwitting victim will happily reveal their date of birth, where they were born, pets names, names of any children and so on. The attackers will gather all that information and use it to their advantage.

Interestingly there are also three different phishing types: Spear, Clone and Whaling. Spear phishing is designed to specifically target an individual, gathering information such as the above Facebook 'game' whereby the scammer can personalise their attack on the victim.

Clone phishing is an attack type that uses a previously delivered, legitimate email containing an attachment but with the details changed and the attachment swapped for a virus or keylogger. To the victim the email looks real, since it's cloned from a real email, and when the attachment is opened it infects the computer.

Whaling is when a phishing attack targets senior executives of a company or a high-profile individual or business. The attack is a finely crafted email or web address that's created to look business-like and containing information specific to the company or individual. ■



Vishing & Smishing

Vishing is voice phishing, using a telephone call to commit some form of social engineering attack. The victim will, as we've explained previously, receive a call from a legitimate sounding call centre with the person on the line claiming to be from a well-known computer related company. Usually the caller will be led to believe that there's a virus on their computer or that some form of security vulnerability has been detected. The victim will then be guided to a website where the caller can make a remote connection to their computer. Once on the victim's computer, the caller will then run a script that will display reams of data on the screen designed to confuse and baffle the victim. In the meantime, they're secretly running a keylogger in the background.

In some circumstances they can then claim to have fixed the so called issue but ask you to log into your bank to double-check all is well. With a keylogger in place, they can then see your username and password on their screen; after which they log in and steal from your account.

Alternatively an automated call can ask you to enter your credit card number into the phone's keypad, as it's been reported as being used elsewhere. Of course it hasn't but as soon as you enter the details they're recorded and your card can be used by the scammers. ■

Smishing is an SMS form of phishing. In these cases you receive a text from a seemingly legitimate source, usually your bank or credit card company but also in the form of a competition winner or something free, asking you to confirm your details. There's often a link for you to follow, which leads to a false website that logs your keystrokes and records your data.

Some smishing attacks will ask you to send a return SMS to approve an action, such as a delivery of some goods. The return message is designed to cost significantly more than the usual SMS rate, with the money going straight to the scammers.

One way or another, each of these scams are designed to bait the victim, hence the phishing element, a homophone of the word fishing. The best defence is to ignore, delete or hang up on anything that's even remotely suspicious. Microsoft doesn't know if you have a virus, and nor will it telephone you. Your bank won't email you for your account details and don't be tempted to fill in any Facebook games with personal information. In short, be savvy about baiting techniques and remain vigilant. ■

Pharming

Whilst on the subject of homophones, another recently added word to the long list of security threats is Pharming. Pharming falls within the online fraud layer of security and although in reality it's been around for as long as web pages have, the methods of deception are continually evolving.

So what exactly is pharming? In short, this is the criminal act of producing a fake website and redirecting the victims to it. The website could be anything from a reasonably popular online shopping store, to one of the well-known high street banks. The victim, unaware that the web site is fake, as the front end apes the real thing, even down to the small print at the bottom of the page, will login with their details.

After the user has logged in several options are available to the 'pharmer'. They can collect the username and login details and simply leave the victim with a blank web page; this is usually a method used by an amateur pharmer or those who want a quick username and password grab before disappearing into the darkened corners of the Internet. Otherwise, they can redirect the victim to the real site where they need to enter their login details again. The latter is a more convincing method of pharming, as the victim rarely questions why the bank has asked for their login credentials twice; they often put this down to a mistaken entry on their part.

Either way, the pharmer now has a considerable list of valid usernames and passwords for the bank or online shop they faked, which they can then sell via the Dark Web or use themselves. How do they, the pharmers, get away with being able to do this? Interestingly, there are several ways in which someone can fake a legitimate website.

Pharming has become quite sophisticated in recent years, and with the rise of connected devices that offer Internet

> *Harvesting Time*

access it's quickly become one of the more popular criminal cyber activities.

http:// DNS

DNS cache poisoning is the primary method of creating a fake website with the view to setup a pharming scam. This involves the criminal attacking the Internet naming system, which is responsible for creating readable names for websites, such as www.ebay.com and so on, rather than a string of numbers in the form of the IP address, such as www.184.232.124.65 or similar. The Internet naming system relies on DNS servers to provide the conversion between IP addresses and readable web site names. The attacker can mount an attack on the DNS cache, thus changing the way in which traffic moves on the Internet. Effectively, instead of the user's request to go to www.ebay.com, they're taken to the attacker's fake website instead. Thankfully, these kind of attacks generally don't last for long, as the DNS cache is monitored frequently by many different engineers and companies.

http:// Fake Naming

Fake naming relies on the attacker seconding their pharming attempts with a phishing email. The email can look legitimate and contain relevant information about the person in general. There's often a link at the bottom that although is spelt correctly in the email, is in actual fact a hyperlink to a pharming website that's similar to the real thing but spelt somewhat differently. For example, the email could say 'your overdraft is nearing its limit, please login to www.bank.com to transfer funds…' The www.bank.com part is correct, but the hyperlink and the resulting website may be taking you to www.bnak.com, which although subtly misspelt is often difficult to miss when you're concentrating on the website content.

http:// Hosts

One method that's more difficult to pull off, though if successful is remarkably effective, is to alter the victim's Hosts file on their computer. The Hosts file is located in C:\Windows\System32\drivers\etc\hosts on Windows computers, /private/etc/hosts on macOS, and /etc/hosts on Linux computers. Its function is to map hostnames to IP addresses, translating the readable websites to IP addresses on a local network. However, it can also be used to circumvent the Internet lookup of a legitimate web site, redirecting you to a fake one. It's not often that the Hosts file can be altered, as it's a system file that requires elevated permission in order to edit, but a cleverly written virus can do the trick.

Secure | https:// What To Do?

So how can we be prepared for pharming attacks and combat them so we don't become victims?

STEP 1 Always make sure that the website you're visiting is the real one. Double check that the name in the address bar of the browser you're using has the correct spelling and that other elements of the site are correctly positioned and the logo of the site you're at is the most recent.

STEP 2 Never follow a random email's hyperlinks. Most banks will never send a threatening email anyway but if you're tempted to, hover over the link and check that the translated address matches the real web site name of the bank, for example.

STEP 3 Always make sure that you have a good antivirus program installed and that it's up to date. A decent AV will stop any attempts by someone wanting to alter your Hosts file. If possible, you can make a backup of your Hosts file and occasionally restore it if you want to.

STEP 4 Make sure that the web address you're using has the HTTPS protocol before the actual address of the site. HTTPS is the secure version of HTTP, thus providing authentication of the genuine website. In fact, it's a good ideal to always use HTTPS for every site you visit.

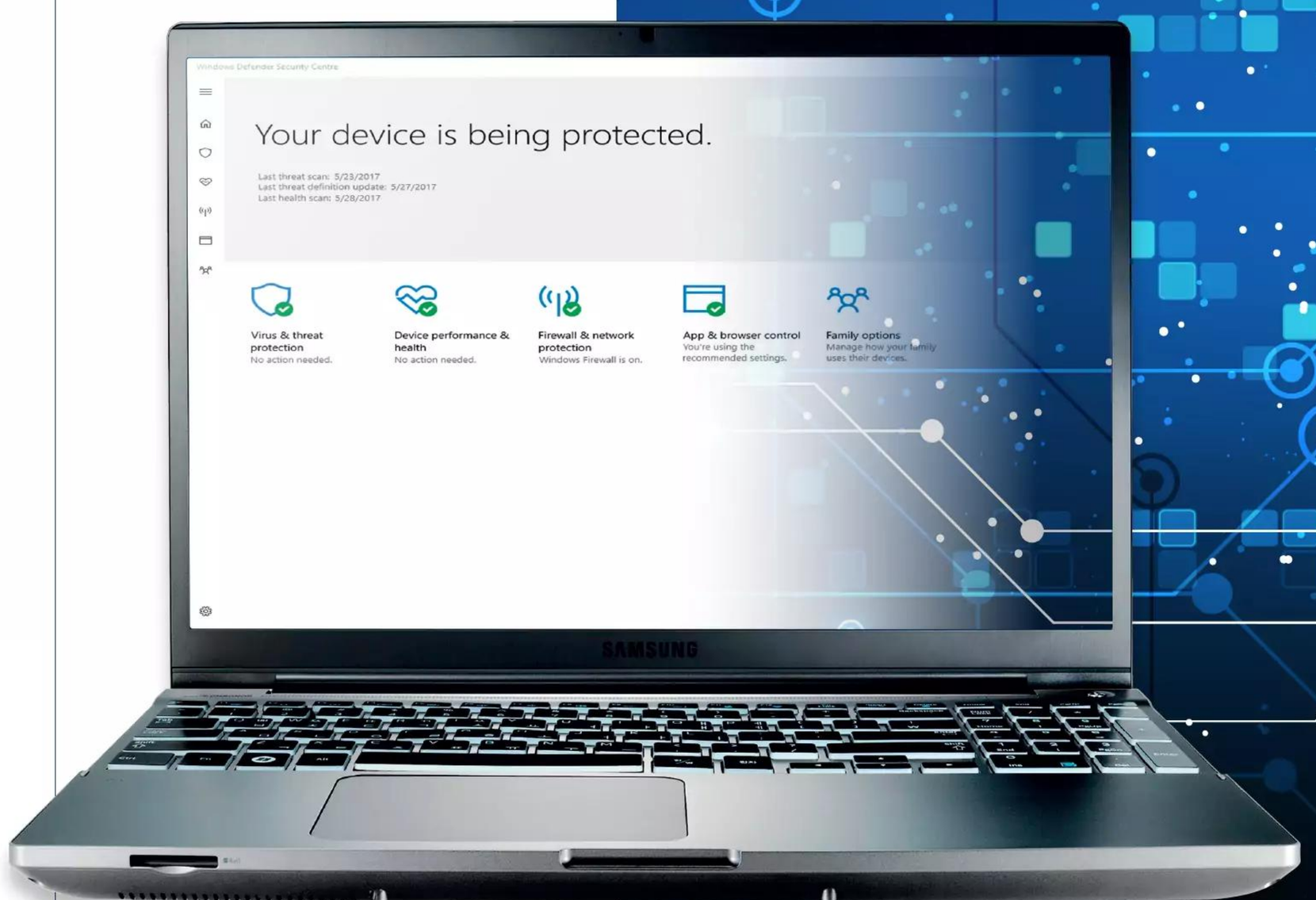
Windows Security

Microsoft is often accused of developing insecure and 'broken' operating systems. However, what the Redmond company delivers is an easy to use system that's as secure as it can be without compromising its use. It's a difficult balance to maintain and security can suffer in the long run.

Security leaks, holes and flaws in development code appear all the time, for every operating system. Windows has the bad luck of being

> *Windows Security Improvements*

at the top of the security flaw news pile. However, here are ten reasons why it's actually a secure OS to use.



Virtualisation-based Security

VBS is an improvement to the core Windows security, it stands for Virtualisation-based Security and uses a mixture of hardware and software enforced developments to create an isolated, hypervisor restricted subsystem for securing the OS core data. Nothing unsigned by Microsoft is allowed to be injected into the kernel or executed.

Secure Booting

Secure Booting utilises the new UEFI (Unified Extensible Firmware Interface), the replacement for the older and more vulnerable BIOS, along with Windows Trusted Boot code integrity and ELAM (Early Launch Anti-Malware) capabilities, to protect the computer as soon as you power it up.

Windows Hello

Windows Hello may seem like a glamorous feature rather than a security feature but it's really quite an impressive layer of protection. Hello supports passwordless biometric authentication methods, such as iris, facial and fingerprint, together with a PIN code to help protect access to Windows 10.

Microsoft Passport

Windows uses the Microsoft Passport single sign on solution that supports the open FIDO Alliance security authentication standard (www.fidoalliance.org) and utilises cryptographic keys to secure access to network and local resources.

Trusted Platform Module

If your computer has a TPM chip (Trusted Platform Module), Windows can utilise the hardware cryptographic key therein to link Passport and Windows Hello to authenticate the user and operating system with local, network and Internet resources.

Credential Guard

Windows Credential Guard protects the user details and Windows authentication keys within the VBS layer. This isolates the authentication service against network and local attacks, stopping keyloggers and other worms from gaining your login details.

Device Guard

Windows has introduced Device Guard, a highly secure tool that determines which programs and scripts should be allowed to run on the computer. It utilises the VBS layer to protect the core system files and with a list of what's allowed and not allowed to run it can prevent most malicious content from being executed on your system.

Rolling Upgrade

Windows's unique method of upgrades now ensures that the latest versions to software, tools and applications are continually upgraded on the computer. The new rolling upgrade process has been widely criticised by many, as there's no opt-out for upgrades available. On the flip side, you're always up to date.

Windows Defender Security Centre

Windows Defender Security Centre is significantly improved over previous versions of the software. The new Fall Creators Edition version offers virus, ransomware and threat protection, device health, firewall protection, app and browser control and family options all under the one roof.

Protection Features

Among the aforementioned security elements, Windows offers User Account Control, Kerberos Armouring, Smartscreen, TPM Key Attestation, Advanced Auditing Settings, Mandatory Integrity Controls, Virtual Smartcards, EMET enabled protection and many more impressive protection features.

Whilst it's all fine and well learning about the different security risks you face every time you boot up your computer, often questions can go unanswered. We've put together ten popular digital security questions that we hope will help fill in any blanks.

Digital Security FAQ

Understanding Security

Trying to understand the digital security world can be hard work. There's so much to take in, that it's easy to become lost in the quagmire of acronyms and homophones. Hopefully we can help you out with these ten FAQs.

Do I need an antivirus program?

Without a doubt, yes. Windows uses the built-in Windows Defender program to help protect you online. It's more than ample for most users but often better security is required.

Viruses and malware are only on dodgy sites, right?

No, sorry. Even legitimate websites can be infected with a virus or some other form of malware. Remember too, a computer virus can enter your system in other ways, not just online.

Is online banking safe?

Online banking is remarkably safe and utilises the latest and continually evolving security encryption methodologies. There's military grade security at every level of the online process, and it's highly unlikely to be hacked.

Are hackers after me?

Whilst it's true that most hackers aren't interested in the average user, they're after bigger targets, there are instances where you could be targeted for one reason or another. Generally speaking, the average user will only be targeted en masse in a country-wide phishing or similar attack.

Can I keep a phishing phone scammer on the line?

Yes, there's nothing stopping you. A school of thought is that while you keep them on the line, turning it into a mock-prank call, you're saving someone else from being duped. However, it's best to simply tell them you know they're trying to scam you and hang up.

Does having extra security cost?

Most of the security changes you can adopt don't cost anything, just you being more aware and knowledgeable about what's going on. In terms of an antivirus product, most of the better total security suites will cost you an annual subscription.

How often do I need to update everything?

Windows keeps a continual update cycle in operation, delivering the latest updates in the background. However, it's always best to do a daily check for any updates for both Windows and any programs you regularly use.

How do I know if something being offered is a scam?

That's a difficult question to answer. More often than not, if it's too good to be true then it's likely to be a scam of some form or another. There are times though when genuine offers are made. It's best to research as much as possible before committing to anything.

I think I've just been scammed, what do I do?

If you think you've been scammed, you need to quickly make some changes: change your Windows password, inform your bank that your details may be compromised, email friends and relatives that you've been scammed, file a police report, scan your computer for threats and check your credit card reports.

I've opened a scam email attachment, what do I do now?

There's a good chance you may have a virus on your computer. Close all open programs, open Windows Defender and do a Full Scan of the system. If anything is detected Defender will tell you what to do. Then, consider a third-party AV suite and scan the computer again.

VPN
Disconnecting...

Protecting Yourself

Being able to recognise a scam or virus is one thing but you need to know how to protect yourself against possible attacks. We look at the top Internet security packages, from Bitdefender, Kaspersky and McAfee, as well as what encryption is and how to make it work for you.

Using a Virtual Private Network is an excellent way to improve your Windows security, we'll look at how a VPN works, what the best VPNs are and how to install and use one on your PC.

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Be Smart

We've looked at some of the many varied ways in which you can be compromised by a digital attacker and some of the ways in which you can help protect yourself. However, it's often more beneficial to be able to recognise the signs of a digital security issue.

Weakest Links

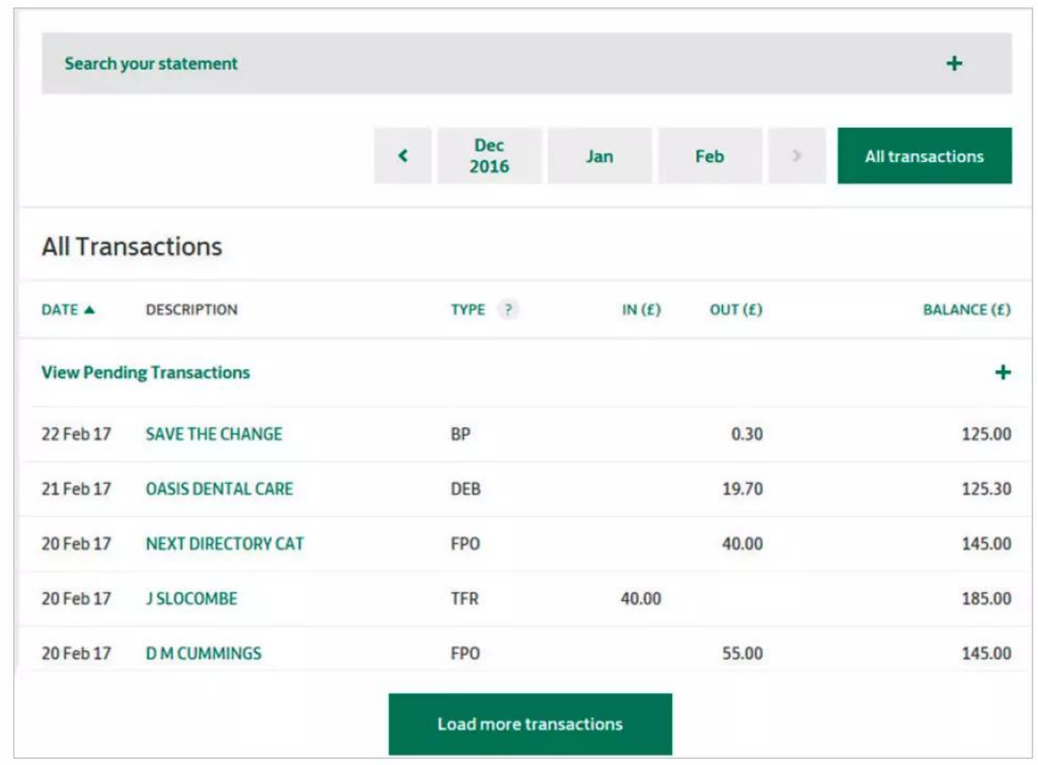
In terms of digital security, you're only as strong as the weakest link in your security chain. You can tick all the security boxes but if you don't know what to look for in the first place you're still vulnerable.

PASSWORD CHANGE

A good sign of a breach in your digital security is the sudden changing of a password. It can be for a random site, webmail or just something small to begin with. Sometimes a hacker with a keylogger in place will test the water before accessing your bank, in which case you need to virus scan your PC immediately.

BANK ACTIVITY

If you check your bank activity regularly and you've noticed some odd, small transactions that you fail to identify, then your account could already be hacked. Sometimes hackers will take small amounts or purchase inexpensive items to check the validity of an account before emptying the vault as it were. Contact your bank immediately.

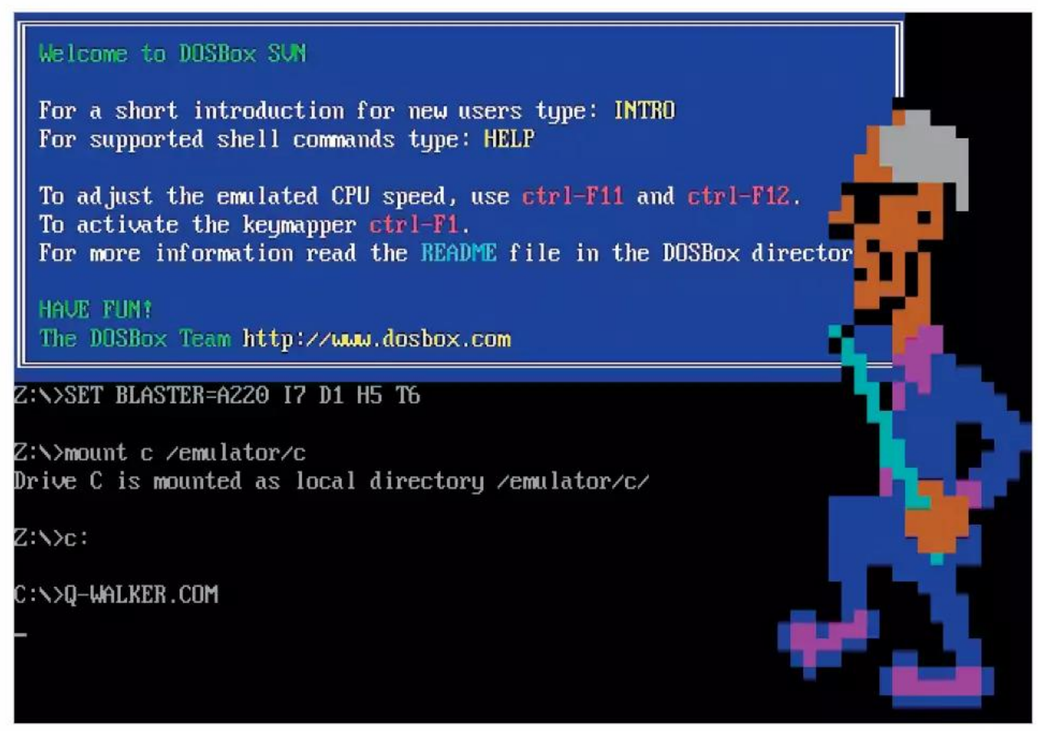


PERSONAL SPAM

We all receive spam emails of some form or another. However, if you suddenly start getting emails of a more personal nature, then you need to look at where that information could be coming from. The details could be your full name, date of birth, knowledge of any children or even a recent accident you may have been involved with.

SLOW PC

One of the many signs of your computer being infected by a virus is the sudden slowing down of the overall system. Most operating systems, Windows in particular, slow down over time but if you power up your computer one day and it's noticeably slower than usual we'd recommend you run a virus scan.



SLOW BROWSER

In relation to the previous tip, a browser slow down can also indicate that something is potentially going on. Browser hijacking can adversely affect the speed at which pages load, as it's sending information to a remote source. Naturally it's not always a digital security issue but to make sure, check your system.

POP-UPS

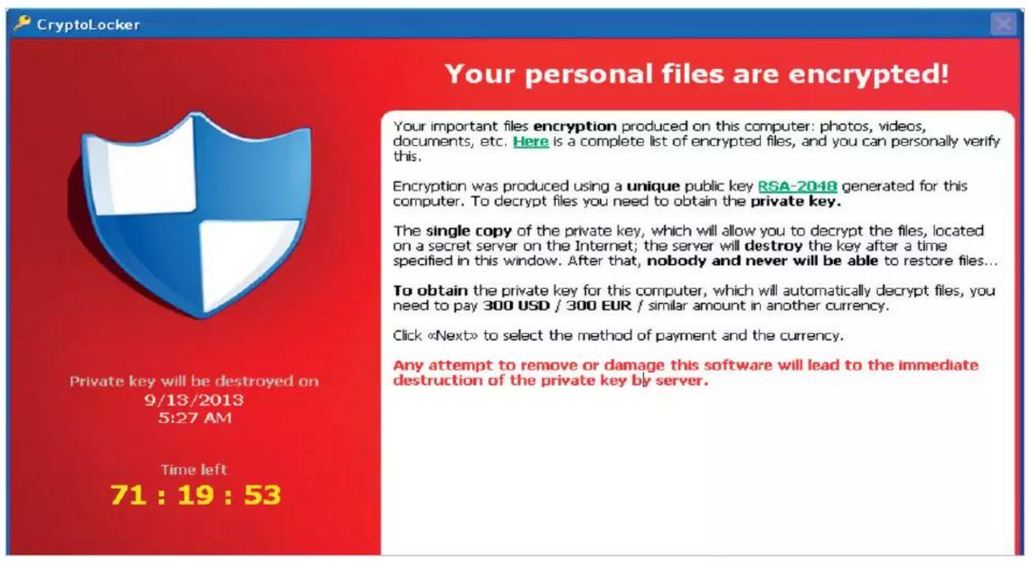
Furthering the browser issue, if you suddenly notice a lot more advertising, pop-ups or similar, then it's usually a good sign that you're infected with some form of adware or Trojan tracker.

INFECTED CONTENT

Viruses want to be spread from one computer to another and they can infect your email or social media platforms. If you suddenly have your friends asking you why you're posting adverts for pharmaceutical enhancements, then there's a good chance you're infected with something.

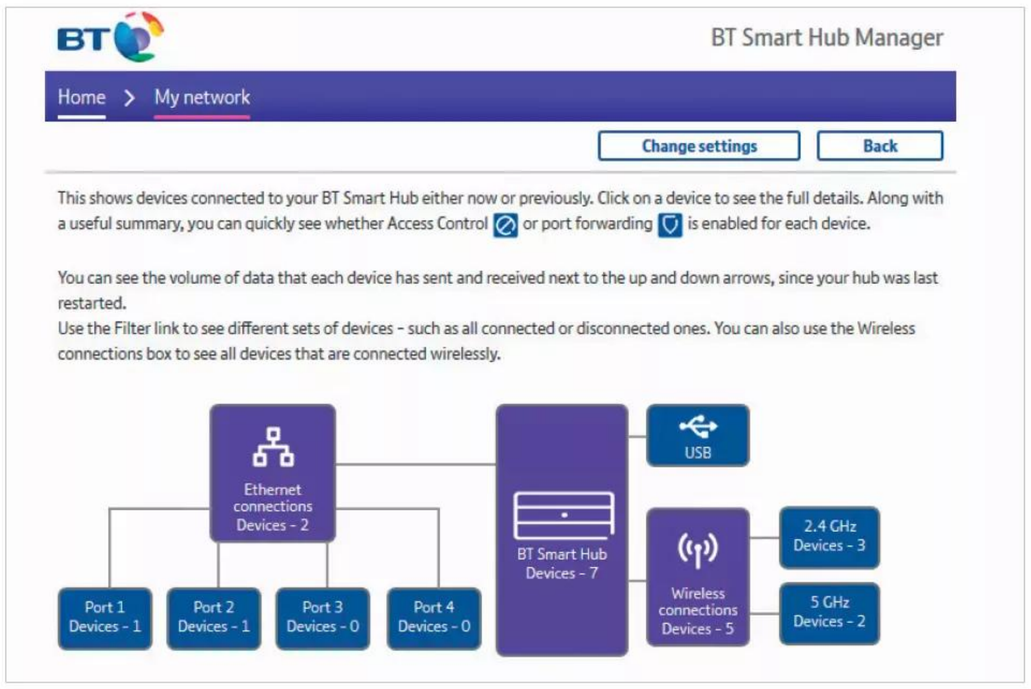
RANSOMWARE WARNING

In the case of a ransomware attack, you don't often get much warning that something is about to happen. Generally speaking, a sudden and inexorable slowing down of your computer will be a key element, as the ransomware is frantically encrypting your files in the background.



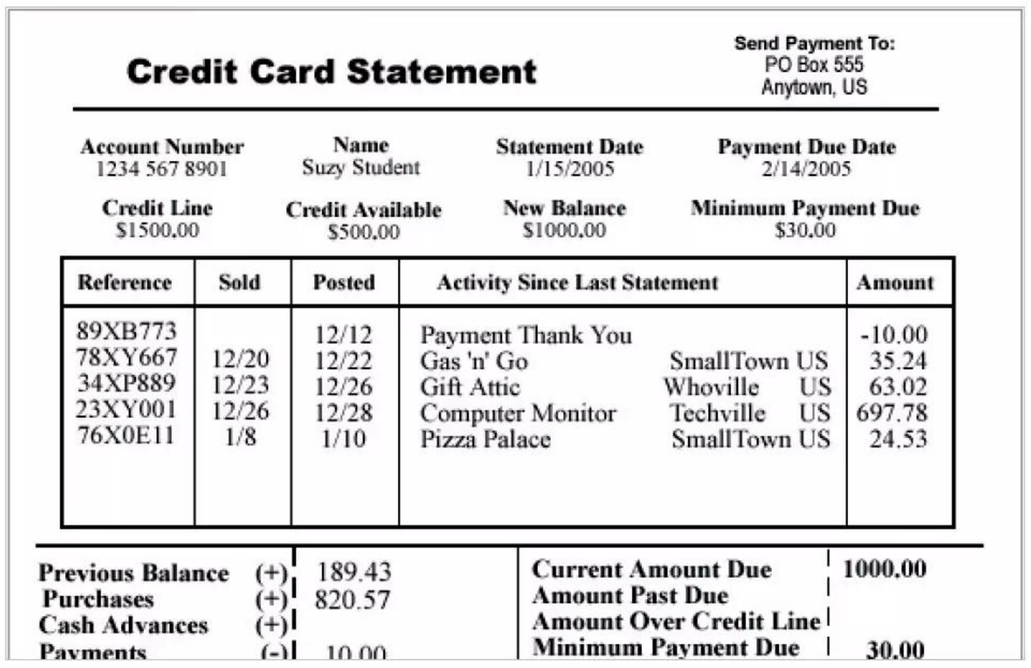
ROUTER LOGS

It's always recommended to check your router's logs frequently. Although hackers are generally anonymous groups or individuals on the other side of the world, often a hacker could simply be a neighbour leeching your broadband connection. Check the logs for any unidentifiable computers attaching to the router.



BANK STATEMENTS

Keeping an eye on your credit card statements will reveal any compromising security leaks. Just as with bank statements, small transactions are usually the first indicator, then once the hacker knows the card is valid they can then blitz it until you've run up a huge debt. Always check your statements and mark any suspicious transactions.



Credit Card Statement

Send Payment To:
PO Box 555
Anytown, US

Account Number	Name	Statement Date	Payment Due Date
1234 567 8901	Suzy Student	1/15/2005	2/14/2005
Credit Line	**Credit Available**	**New Balance**	**Minimum Payment Due**
$1500.00	$500.00	$1000.00	$30.00

Reference	Sold	Posted	Activity Since Last Statement		Amount
89XB773		12/12	Payment Thank You		-10.00
78XY667	12/20	12/22	Gas 'n' Go	SmallTown US	35.24
34XP889	12/23	12/26	Gift Attic	Whoville US	63.02
23XY001	12/26	12/28	Computer Monitor	Techville US	697.78
76X0E11	1/8	1/10	Pizza Palace	SmallTown US	24.53

Previous Balance	(+)	189.43	Current Amount Due	1000.00
Purchases	(+)	820.57	Amount Past Due	
Cash Advances	(+)		Amount Over Credit Line	
Payments	(-)	10.00	Minimum Payment Due	30.00

Top Ten Antivirus and Security Packages

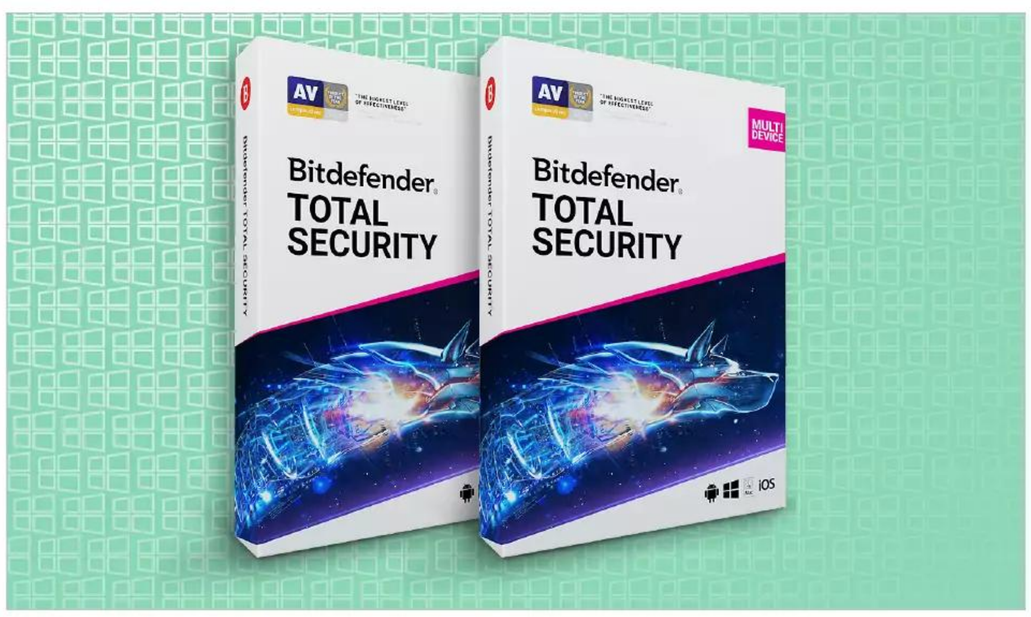
While the built-in Windows Defender is a great antivirus and security tool, it's nowhere near as capable as one of the many third-party security suites. The likes of Bitdefender, McAfee and Symantec have years of security specialism behind their products.

Better Protection

A third-party security suite offers much than virus scanning. With one of these, you're covered against most, if not all, digital threats. Here are ten security suites worth considering if you're serious about your digital protection.

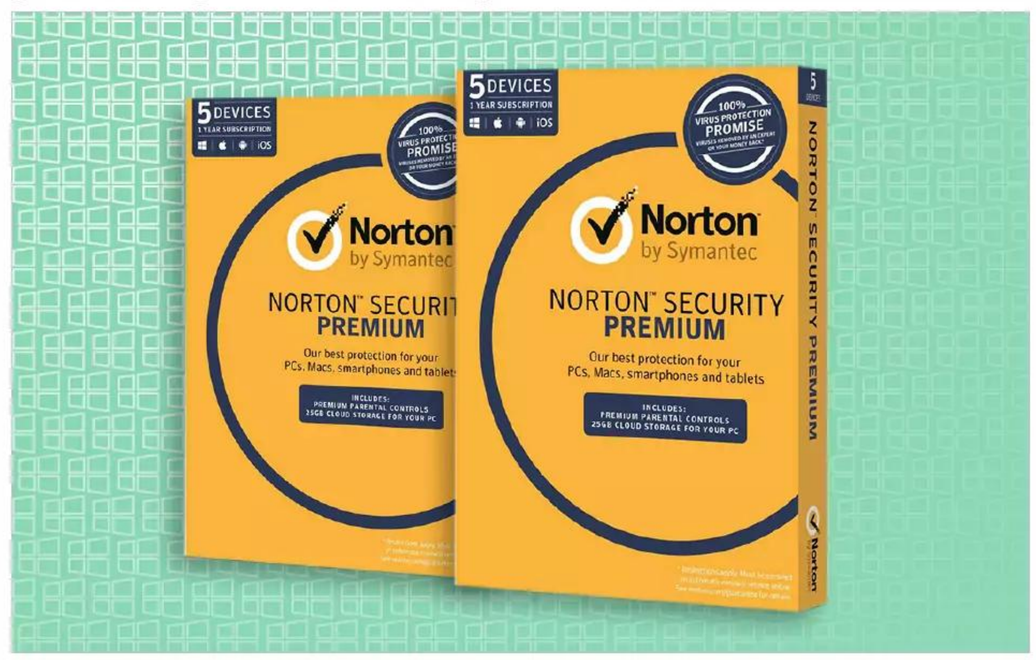
BITDEFENDER

Bitdefender Total Security security suite from one of the world's leading security specialists. This version offers unrivalled levels of protection and performance for Windows, macOS and Android platforms. There's even an advanced ransomware protection element to help protect your folders.



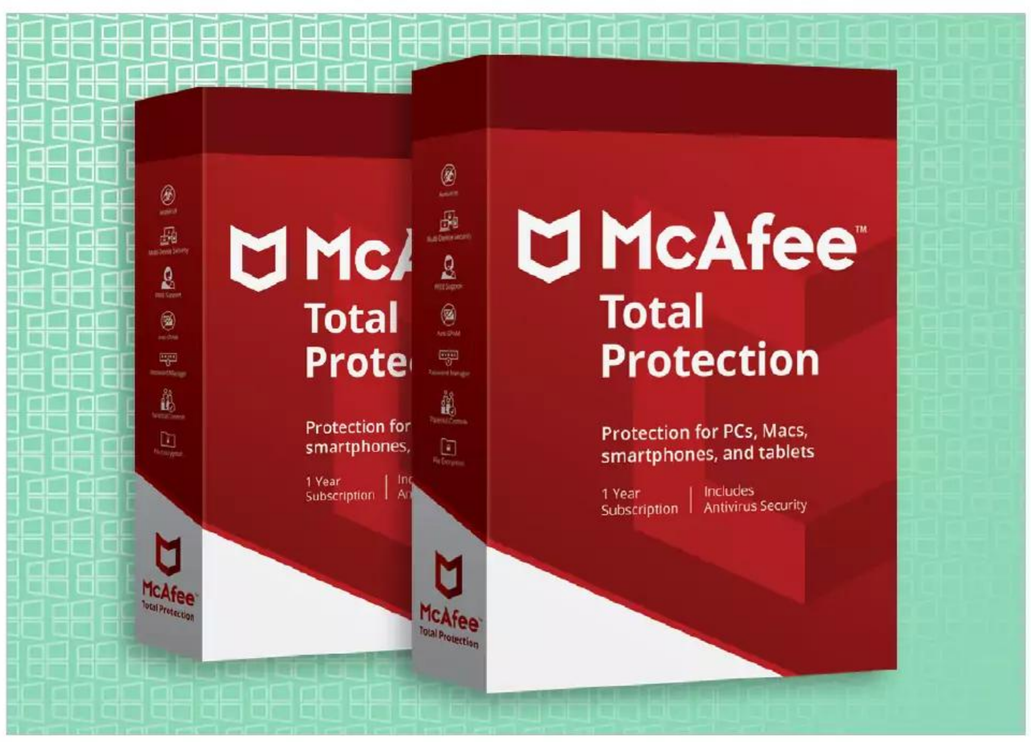
SYMANTEC

Norton Security Premium is Symantec's top choice for the home user. With it, you can protect up to ten PCs, Macs, smartphones, or tablets and it'll keep you safe when shopping online, general surfing, or when conducting transactions.



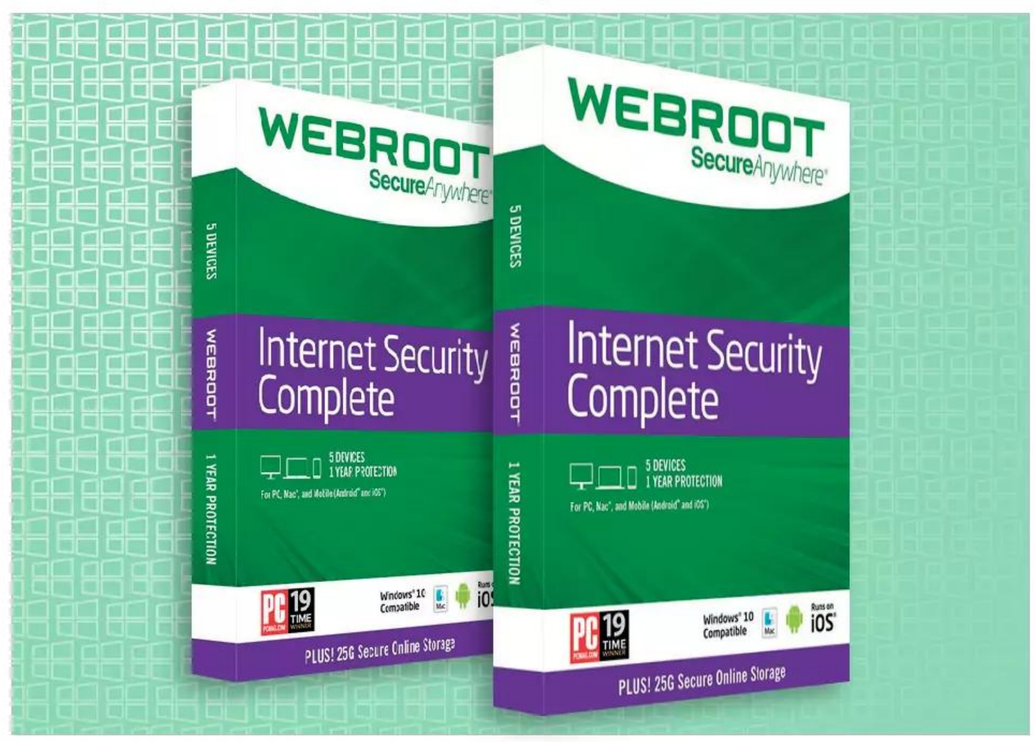
MCAFEE

McAfee Total Protection offers a 100% guarantee of virus removal, or you get your money back. There are three main versions available: Antivirus Plus, Total Protection and Livesafe, each has its own particular twist, but all offer excellent security features and benefits.



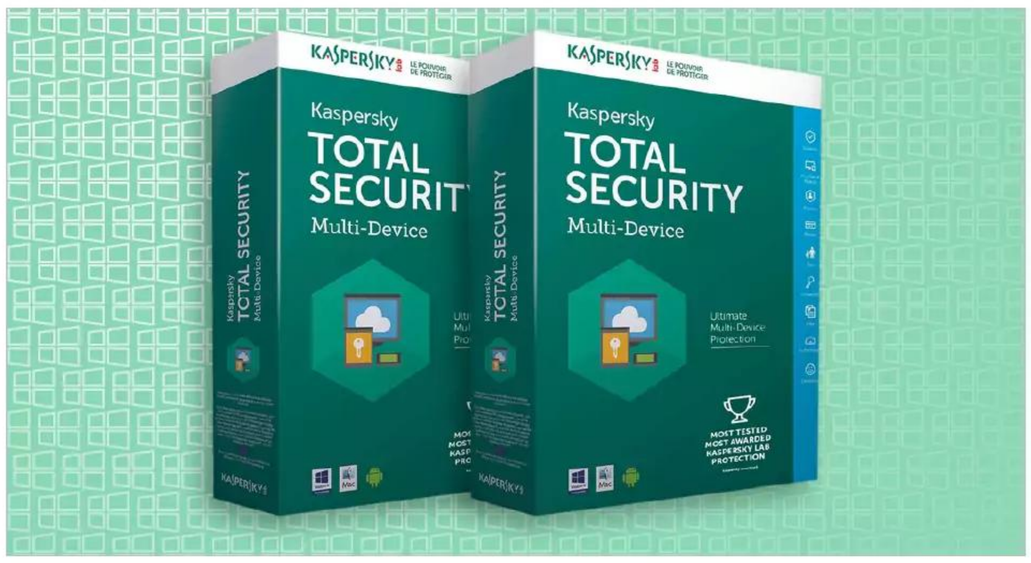
WEBROOT

Out of the three possible solutions available from Webroot, Webroot Internet Security Complete is the one to consider for home users. With it, you're protected from virtually any threat, as well as offering 25GB of secure online cloud storage.



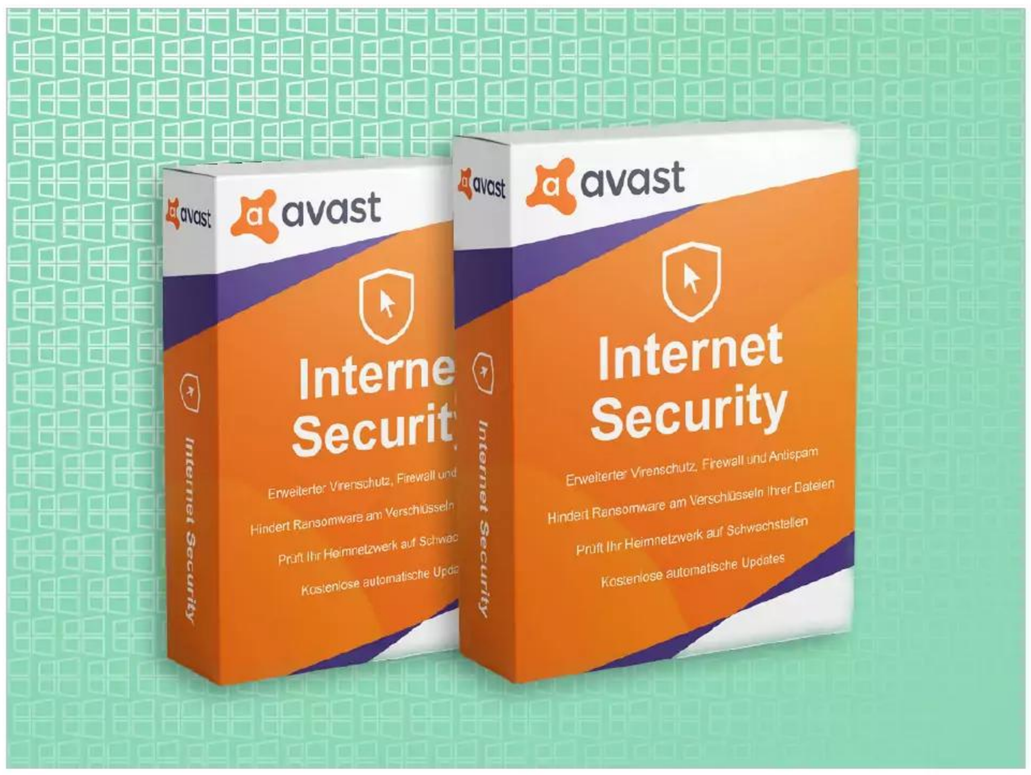
KASPERSKY

Kaspersky's Total Security is one of the best go-to products available on the market. It's great value for money and offers superb protection for your PC and other devices. You get parental controls, secure password storage, encryption and identity protection all under a single security suite.



AVAST

Avast has offered free antivirus software for many years, but its other products: Internet Security and Premier, are also well worth looking into. With both versions, you'll get online banking protection, identity protection and email protection, all for a reasonable cost too.

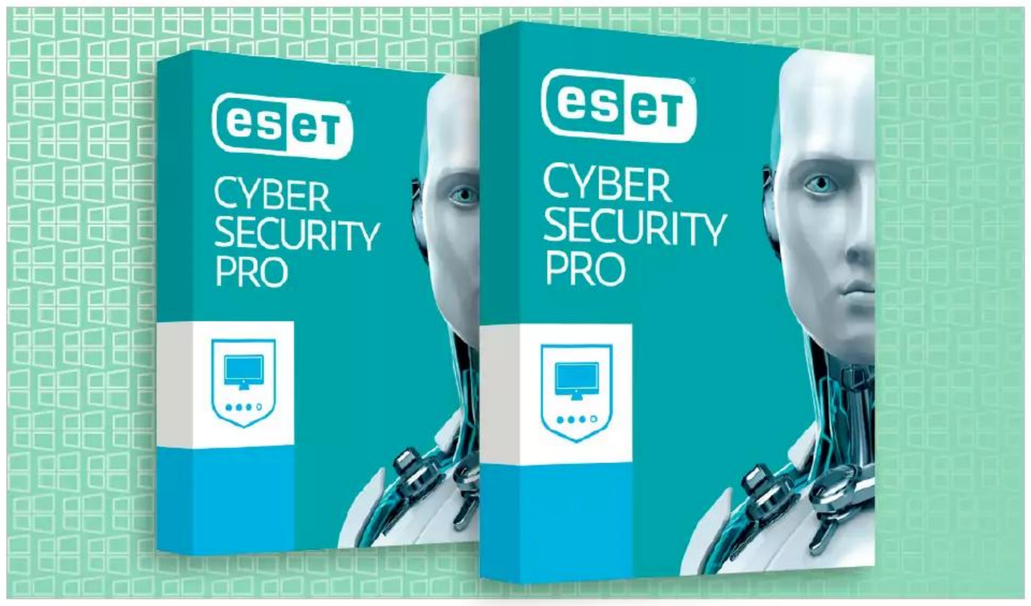


EMSISOFT

Emsisoft Internet Security is an award-winning security suite that offers plenty of great features and elements. It's quick, easy to use, cost effective and does an excellent job at protection you and your devices from modern security threats.

ESET

ESET Internet/Cyber Security is a comprehensive protection package for everyday users. It offers online banking protection, alerts for any malicious attempts to control your webcam and a fine-tuned balance between security and privacy.

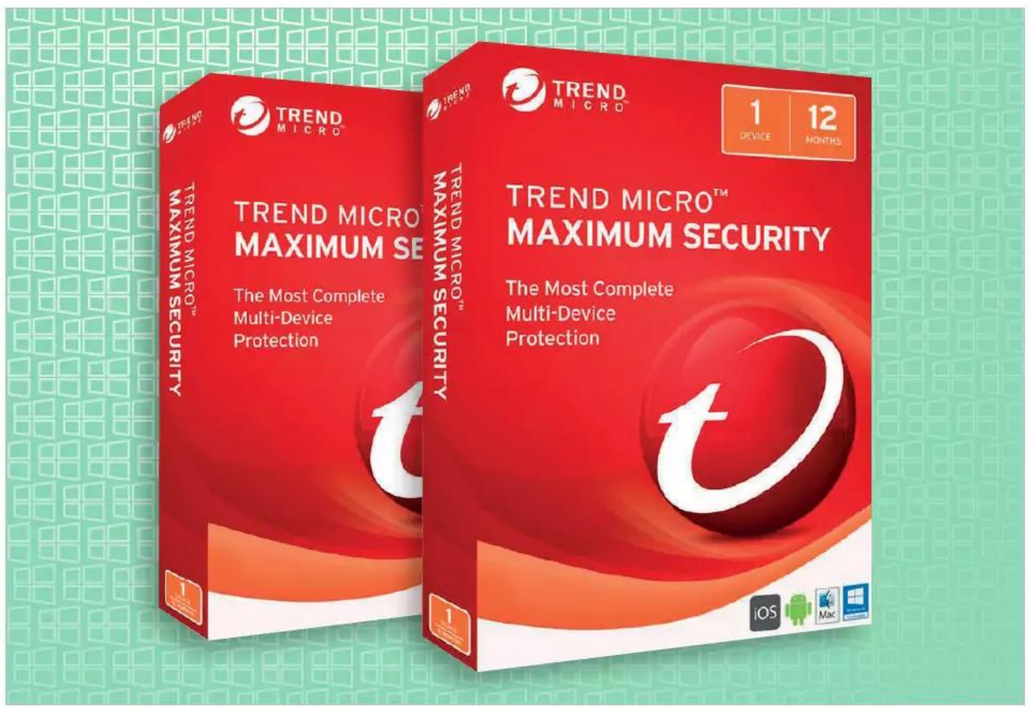


F-SECURE

F-Secure has been in the security and protection business for a lot of years and as such, its products are often considered one of the best available. F-Secure Total is the top choice for the home user, as not only does it provide superb antivirus protection, it also offers a Virtual Private Network (VPN) for added privacy when online.

TREND MICRO

Trend Micro Maximum Security offers superlative protection for up to five different devices along with extended protection for children, Internet passwords and privacy on social media sites. It's great value for money and performs excellently too.



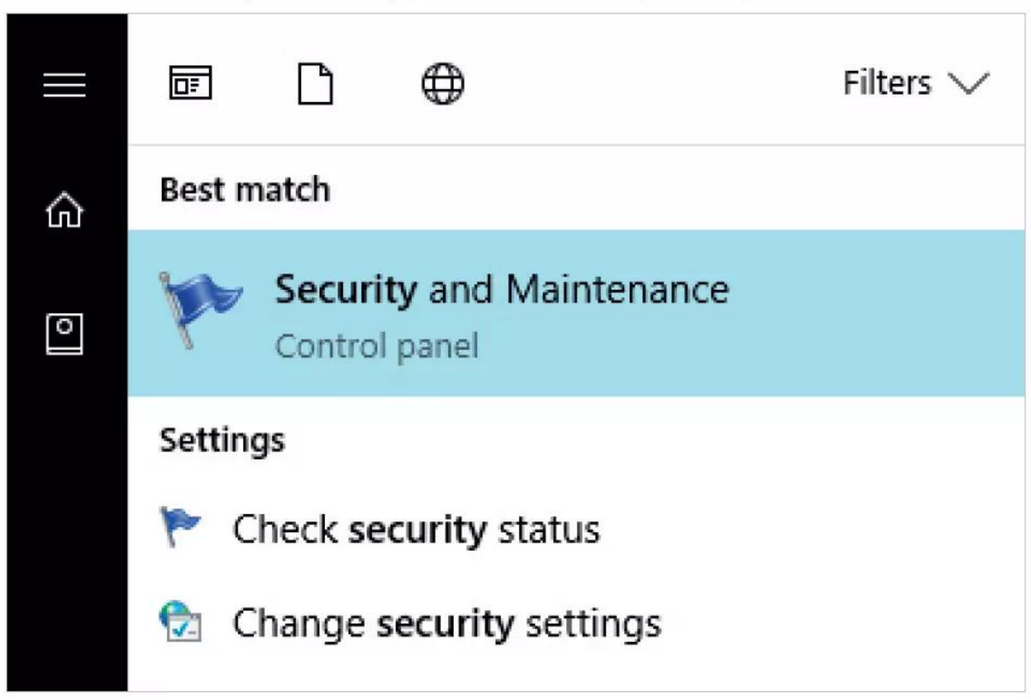
Setting Up Windows Security

Before we dig deeper into the many levels of Windows security features, it's worth taking a moment to check that the initial security features are in indeed up and running, and doing what they're supposed to.

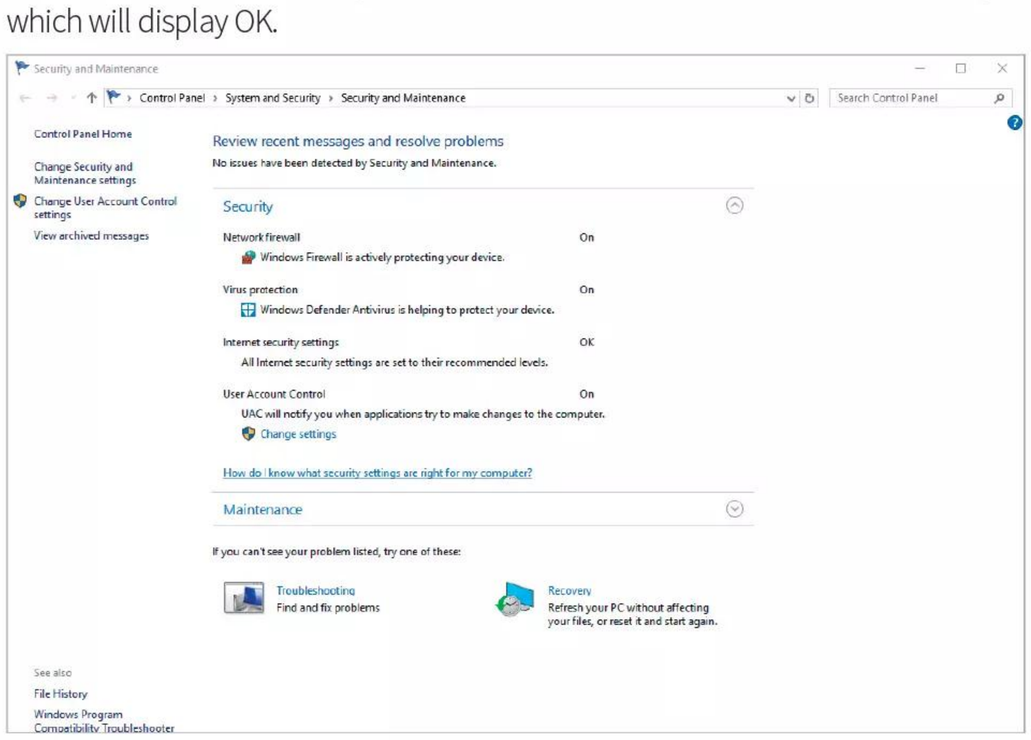
Are You Secure?

Remarkably, despite having an antivirus client installed, some users aren't even aware of the default Windows security features. Here's a quick ten step process to check everything is working as it should.

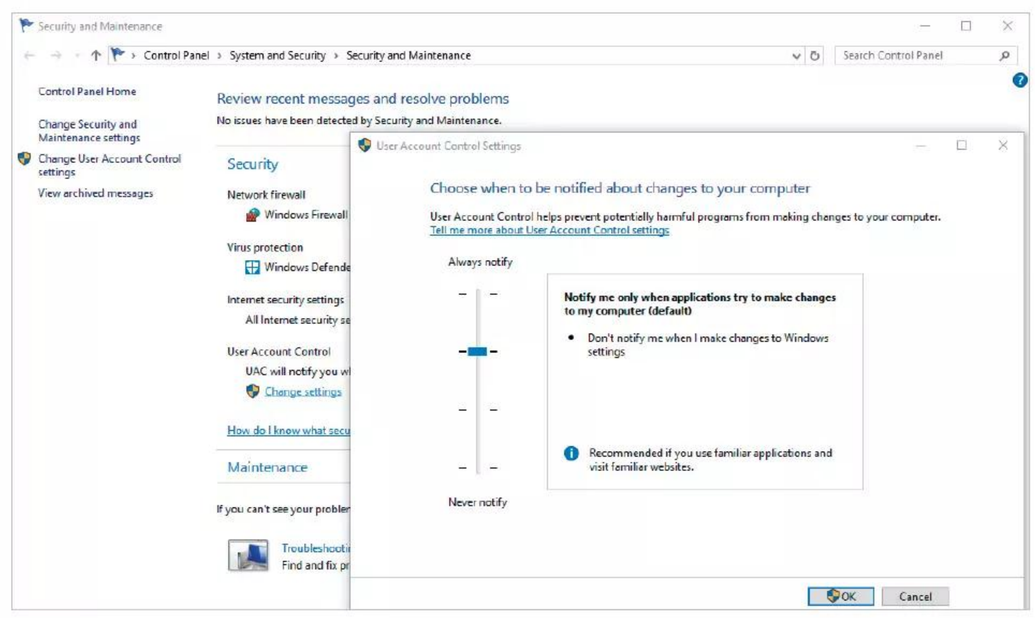
STEP 1 Start by clicking on the Windows Start Button or pressing the Windows key on your keyboard. Enter security into the search bar and click the first option that appears in the results, Security and Maintenance.



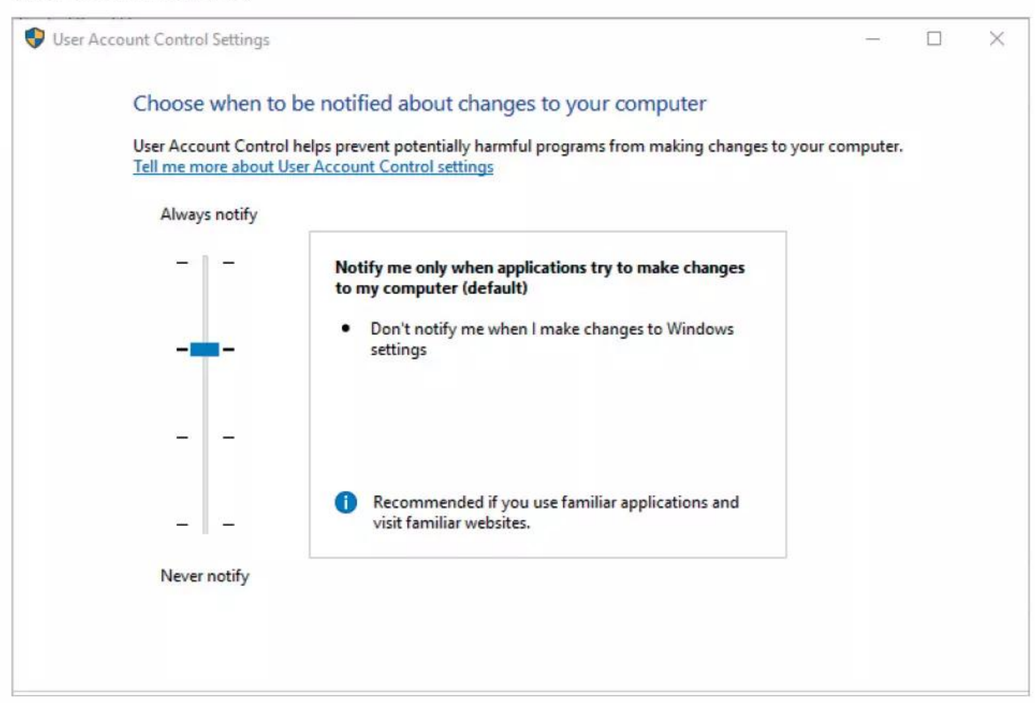
STEP 2 This will open the Security and Maintenance section of the Control Panel. There are two main sections within this page, click on the Security section to expand it. Ideally all the options within the Security section should be displaying On, with the exception of Internet Security Settings which will display OK.



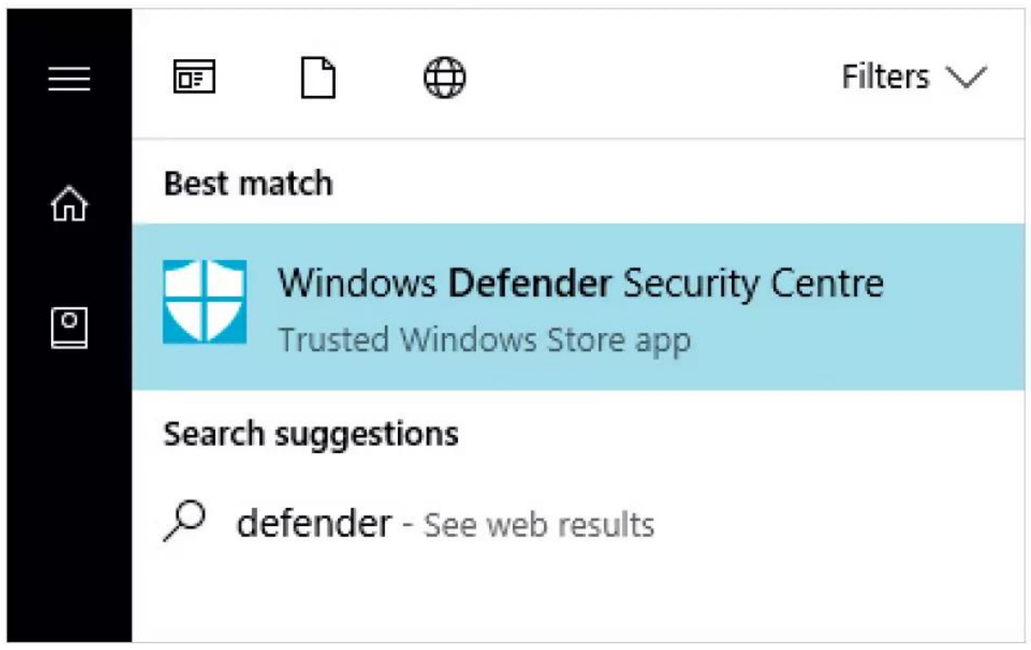
STEP 3 Should any of the options display No, then you'll need to check the setting relating to that particular feature. For example, if your User Account Control (UAC) is set to Off, click the Change Settings link under the UAC option. The other features can be found via a search from the Windows Start Button.



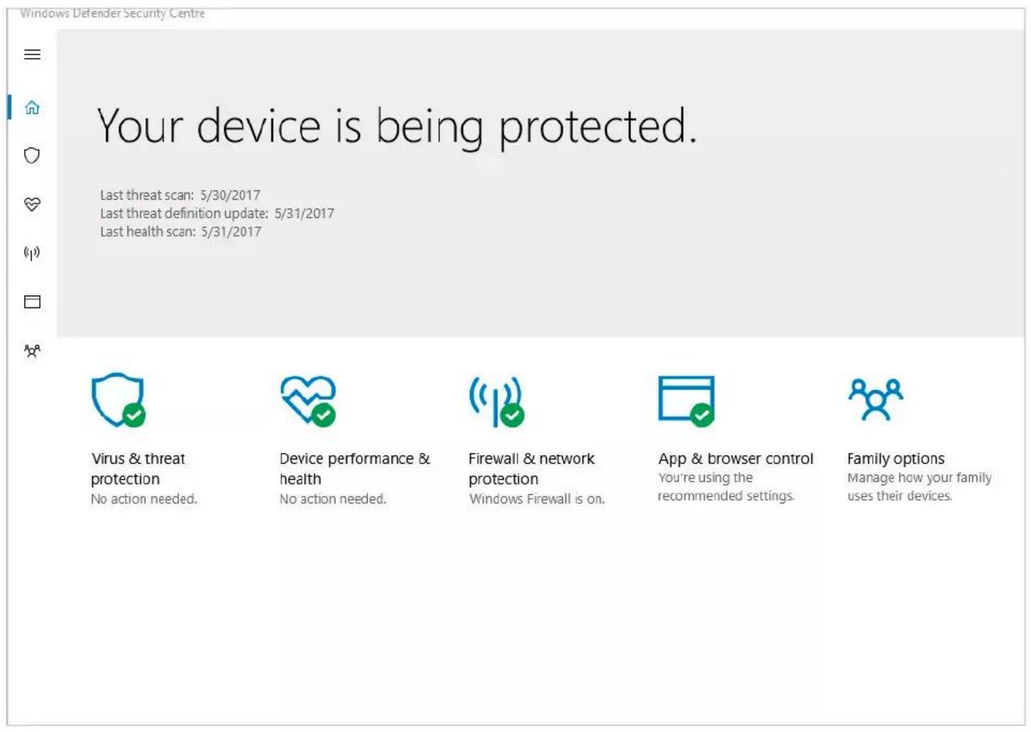
STEP 4 UAC will warn you of any attempt to access a system critical file. If any malware wants to alter a file, then you're asked if you want to proceed; obviously you don't, so you can say no and investigate the issue. There are various settings to choose from but the second step down from the top is the recommended.



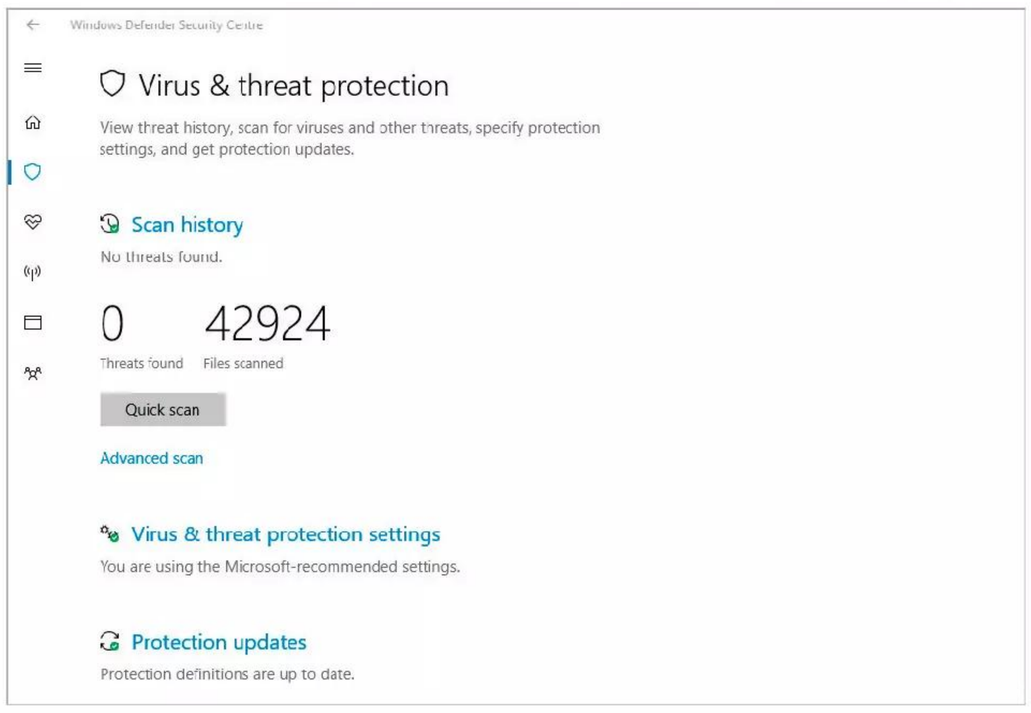
STEP 5 Close down the Security and Maintenance window, then click the Windows Start Button and search for Defender. Click the resulting Windows Defender Security Centre option.



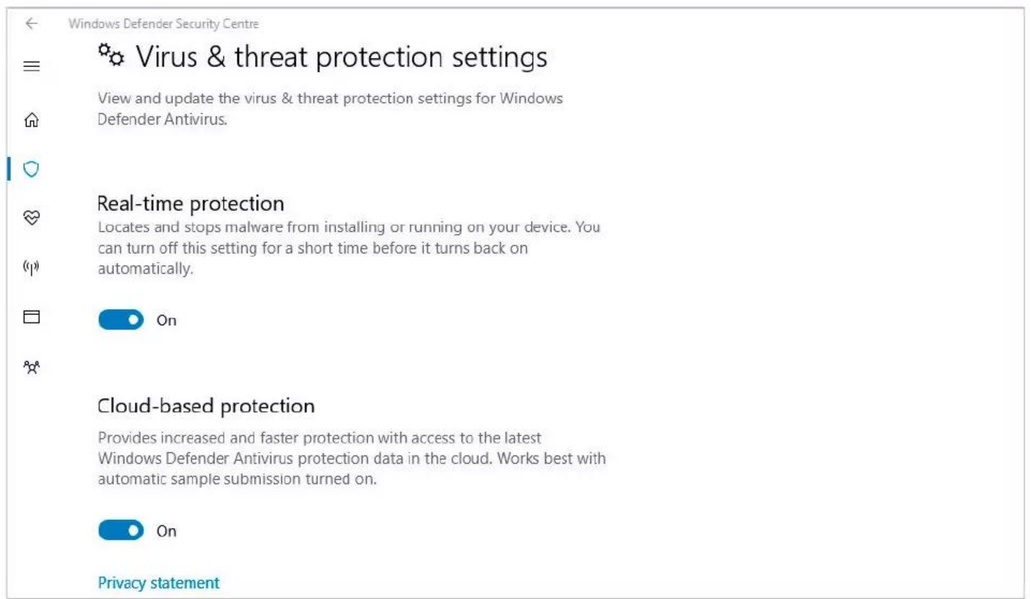
STEP 6 If you're not using a third-party security and AV suite, then you need to make sure that Windows Defender is activated and working. There are numerous options available in the new-look Creators Edition Windows update of Defender. Each can be selected with a mouse click and viewed separately.



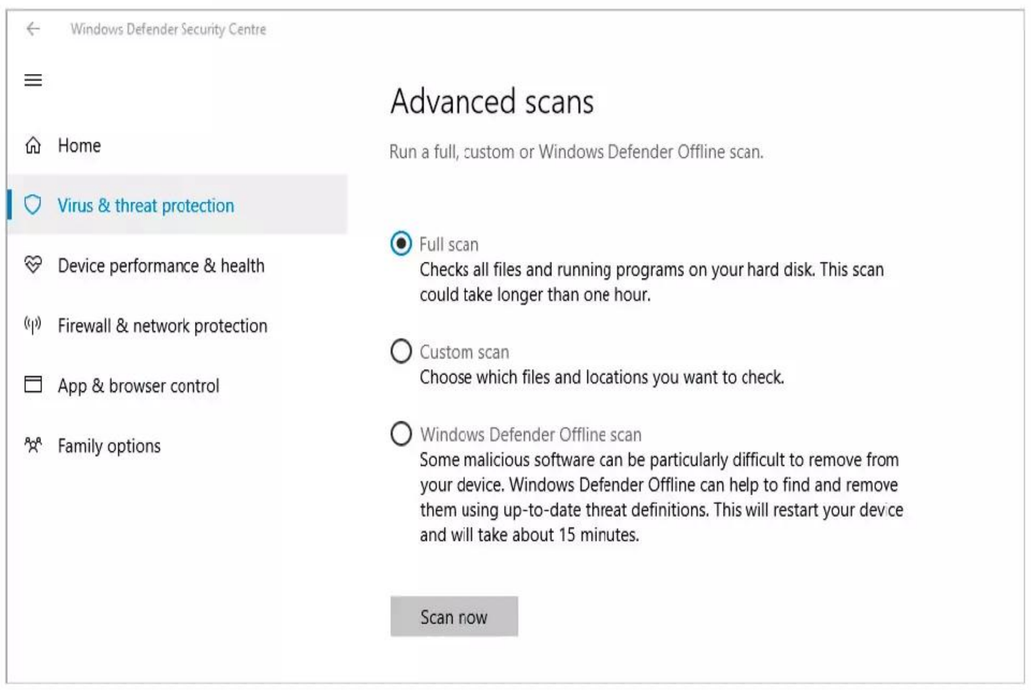
STEP 7 Click the Virus & Threat Protection option. This will open a new window allowing you to perform a Quick or Full Scan of the system that details the number of threats found and the number of files scanned.



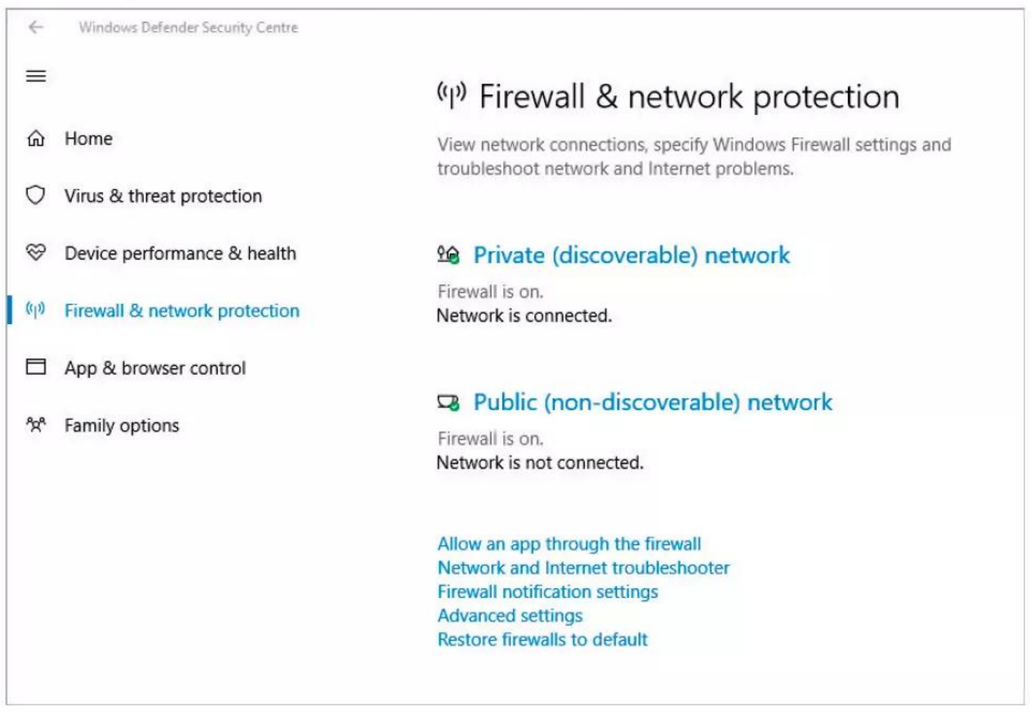
STEP 8 If you click the Virus & Threat Protection Settings option, you can further opt to improve the system protection. Make sure that all the sub-options are set to On and scroll down to define the program's default Notifications.



STEP 9 Returning to the main Virus & Threat Protection page, you can click the shield icon from the strip to the left of the screen; then click on the Advanced Scan link, located under the Quick Scan button. Within are options to run a Full System scan, a Custom scan (of a network location, for example) or an Offline scan.



STEP 10 Lastly, click on the Firewall & Network Protection from the icon strip to the left. Again, if you're not using a dedicated, third-party security suite, make sure that the Private and Public Firewalls are set to on, thus protecting your system from unwanted intrusion.



Why Updating is Important

Continual updates, rebooting after an update has been installed, then the inevitable second reboot straight after the first to apply the update: it's little wonder people stray from the regular update checks. Whilst it can be a pain though, keeping things up to date is a top priority.

Update, reboot, update, reboot

Updates may well be the bane of the modern computer user but they are there for a reason. It's not the 8-bit era anymore, we need those updates to help protect our security. Here are 10 reasons why they're important.

PATCH VULNERABILITIES

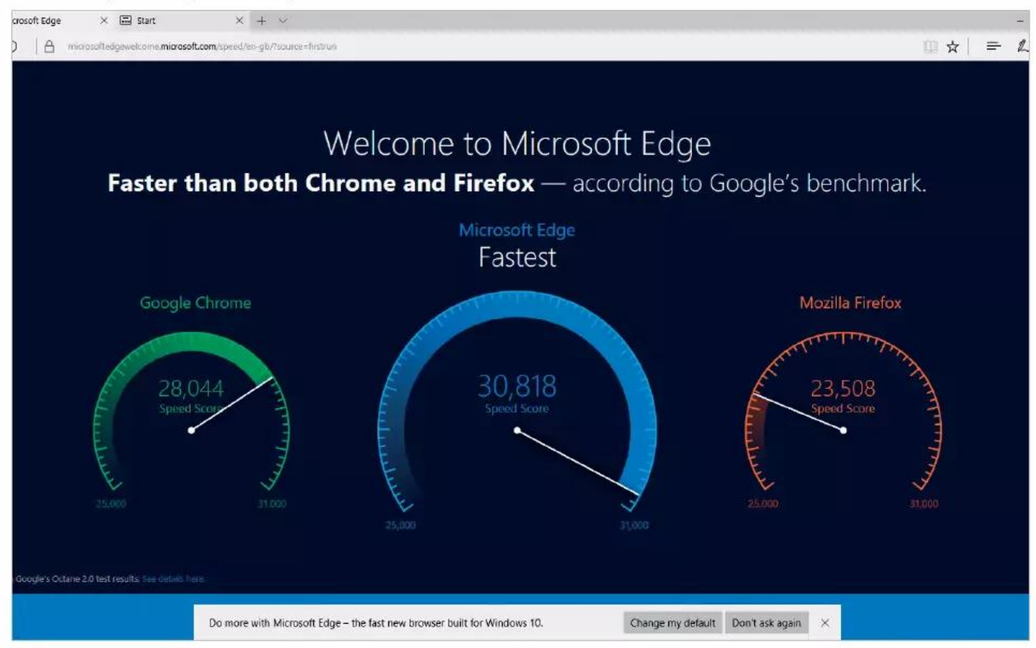
Windows updates patch recognised security holes in the core system. Many of the viruses around today exploit a vulnerability in the Windows code that hasn't been fixed yet. So when an update comes along, that potential flaw will be ironed out.

EXTRA SECURITY

In addition to potential security glitches in the code, often an update can contain an extra level of security that's been programmed in by the developers. For example, the code that handles remote desktop requests has had a security patch but another code that handles the authentication is hardened as a result.

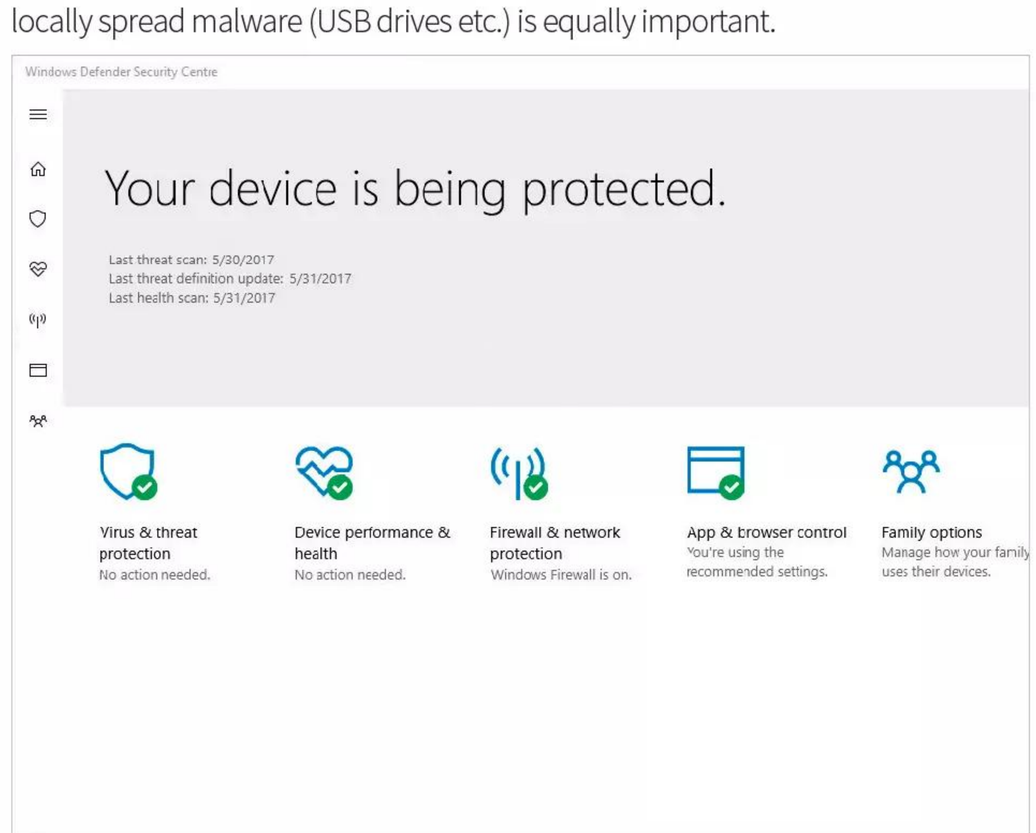
BROWSER UPDATES

Windows comes with many different programs to make it a more appealing environment. They include Internet Explorer and Edge browsers. As a part of Microsoft, these will need to be in tip-top working order to help prevent any modern Internet-borne viruses from entering the system. Daily update checks will keep things in shape.



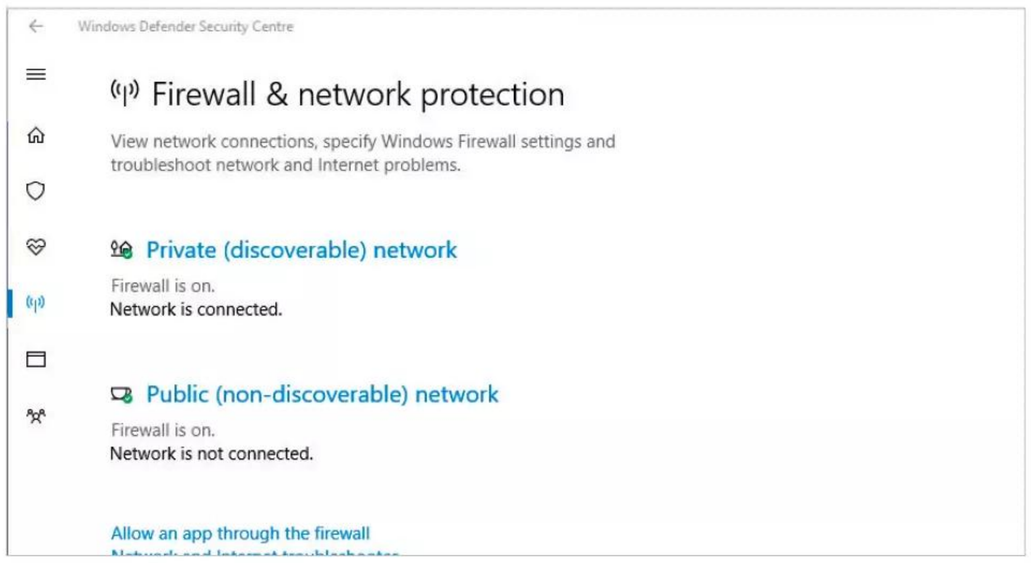
DEFENDER UPDATES

Windows Defender and its other security elements will require at least one update a day to keep up with the latest virus definitions. This is a much needed aspect of updating, as even if you only go online once every so often, being protected from locally spread malware (USB drives etc.) is equally important.



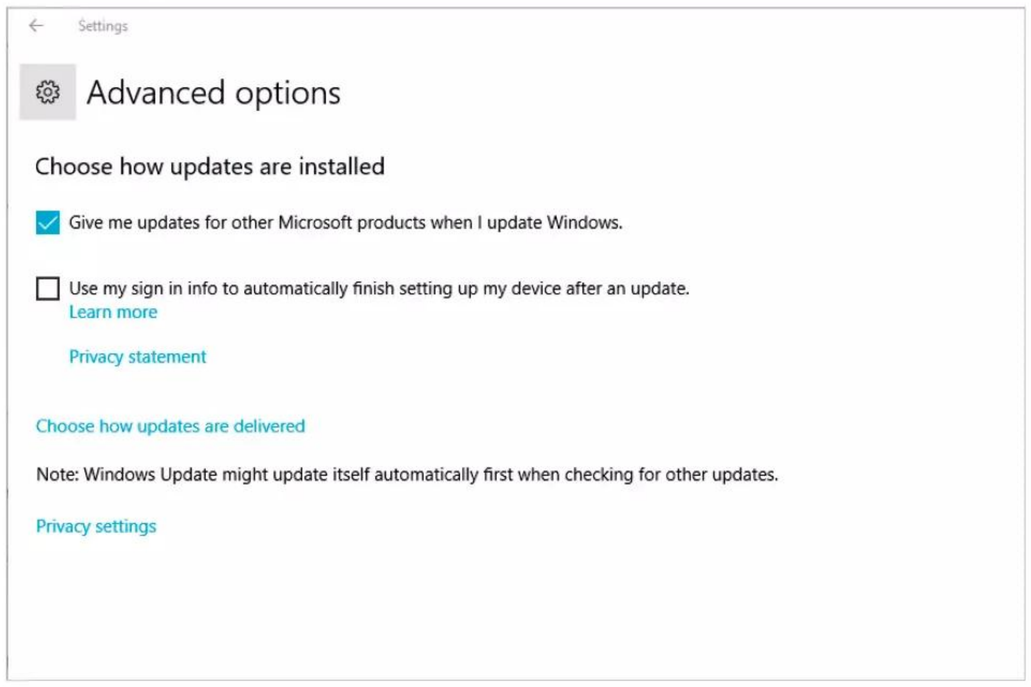
FIREWALL UPDATES

To expand the last reason, the Windows Firewall is one of the first layers of security on your system. With it, access to your computer from another source is monitored and even blocked, stopping potential threats before they even hit the virus defence layer. Updates make sure that the Firewall is up to scratch for the job.



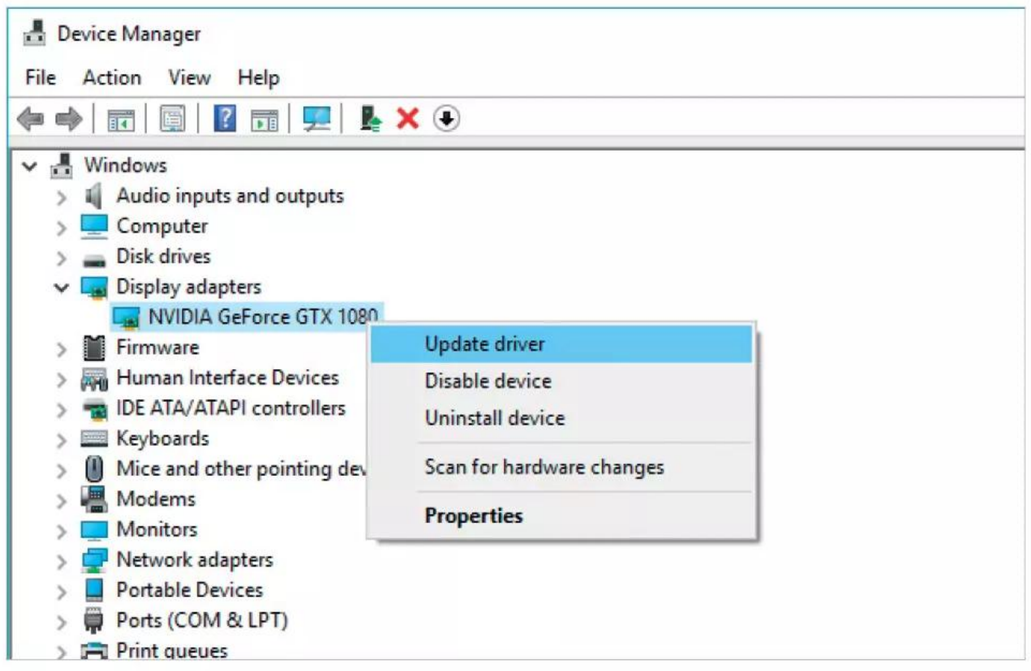
OFFICE PATCHING

It's not just the Windows core files that require regular updates, if you use Microsoft Office that can be a part of the overall Windows update schedule. There are vulnerabilities in Office too, which when exploited can allow malicious code in the system. Tick the Give me updates for other Microsoft products box in Windows Update's Advanced Options.



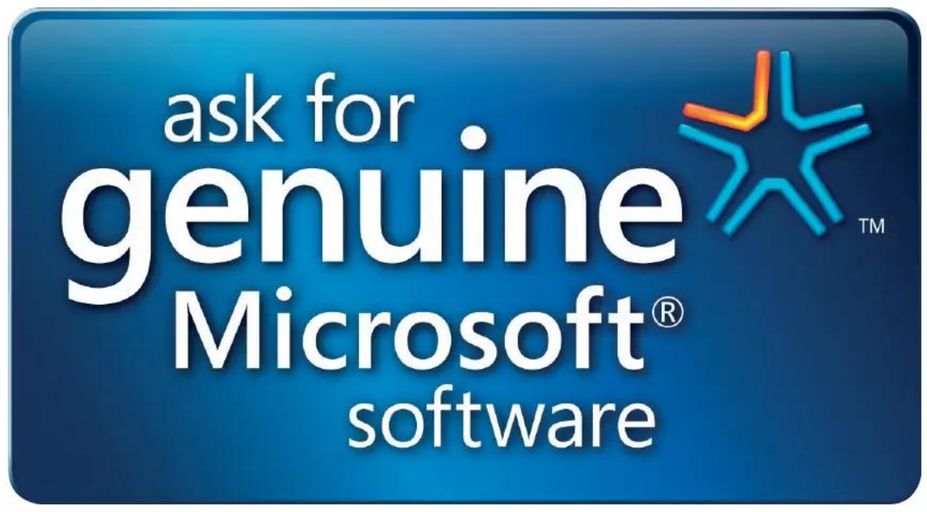
SIGNED DRIVERS

As well as Office, Microsoft provides base-level drivers for most of the hardware available today. These drivers are signed and verified as safe, so any new piece of hardware installed will work and will be safe according to the driver protection engine.



GENUINE SOFTWARE

Non-genuine copies of Windows have been a thorn in Microsoft's side since illegal file sharing on the Internet gained popularity. These days the act of downloading something illegal is rampant. Windows updates ensure that you're using a genuine copy of the OS, which will ultimately secure you PC against threats from pirated copies.

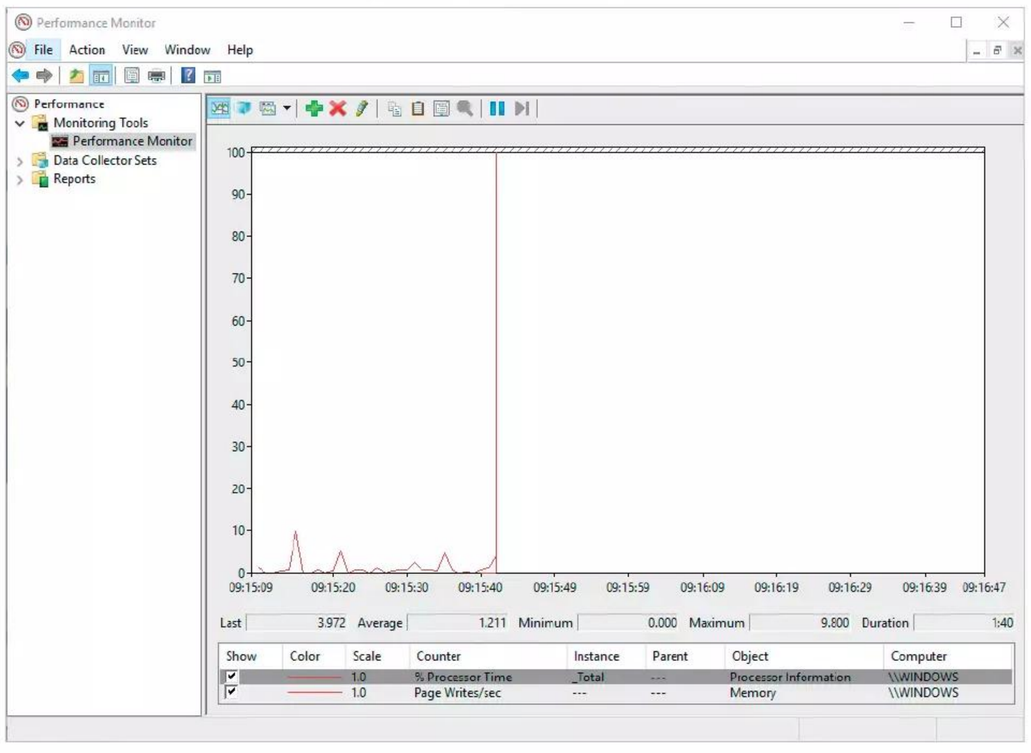


FUTURE UPDATING

Microsoft has big plans for the future of Windows, it's often mentioned that this will be the last full version of the OS as they will be running Windows as a service as opposed to different versions over time. This means it will be a constant update cycle with adding or removing of features. Updates ensure you're running the latest versions.

STREAMLINING CODE

Updates not only patch any vulnerability, they can also free up system resources by improving the code and streamlining the available resources. In short, if your computer is performing better, then it can easily handle background virus and threat scans without affecting what you're doing.



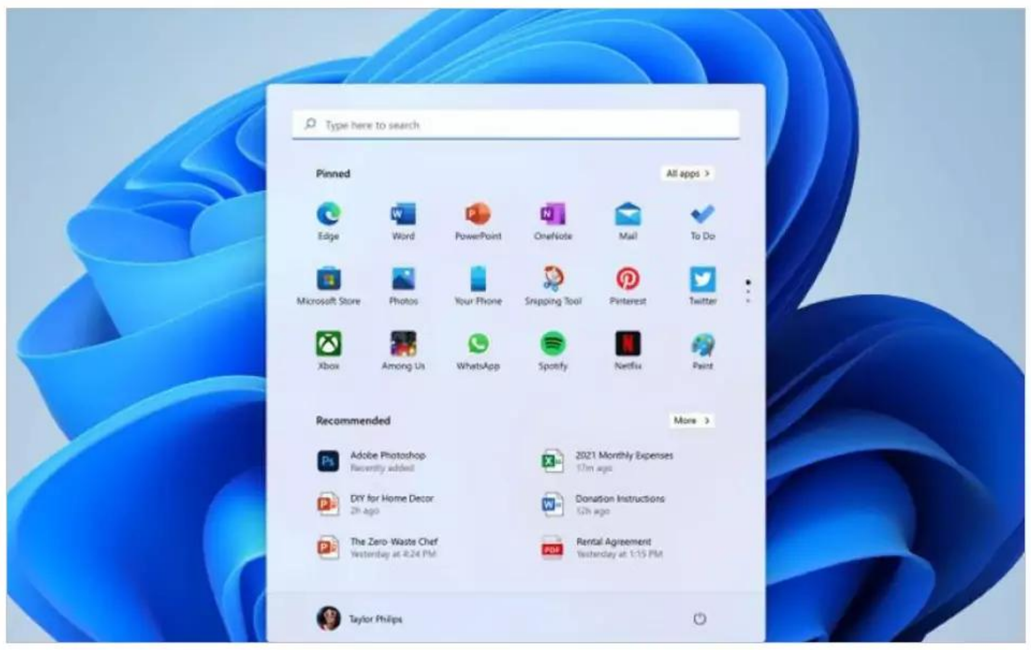
What to Keep Updated and How

Discussing updates is one thing but how do you go about making sure that you have the latest updates and that all the necessary components are being updated correctly? Thanks to the improved update process of Windows, this is surprisingly easy.

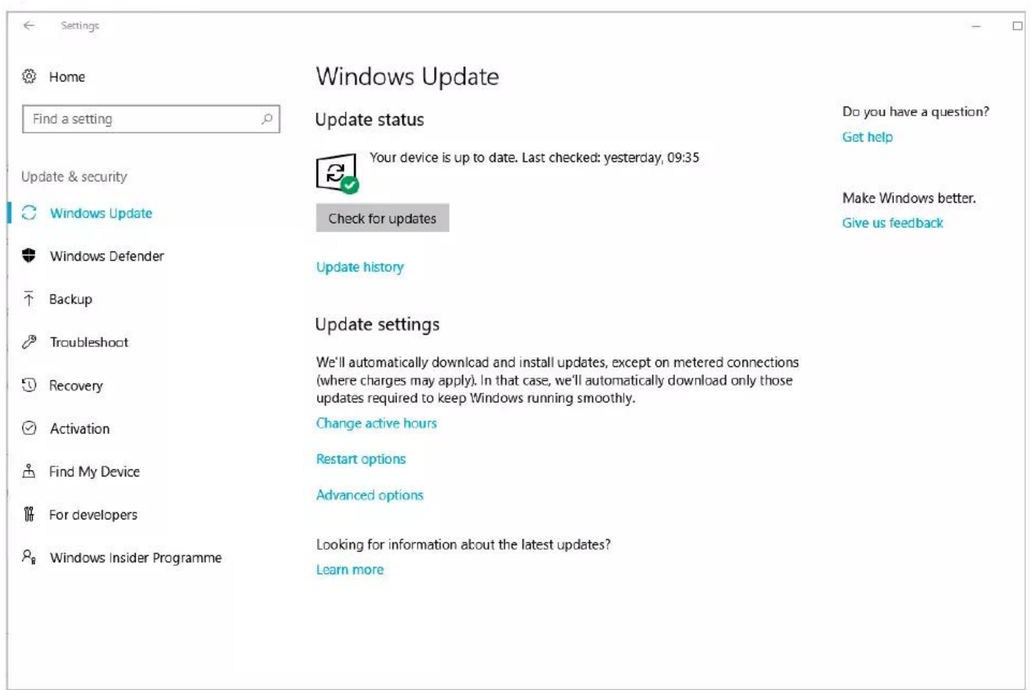
Keeping Up To Date

Whilst it's easy to update Windows, there are elements that can be missed. We've already mentioned that it's not only Windows that needs updating but also software and drivers.

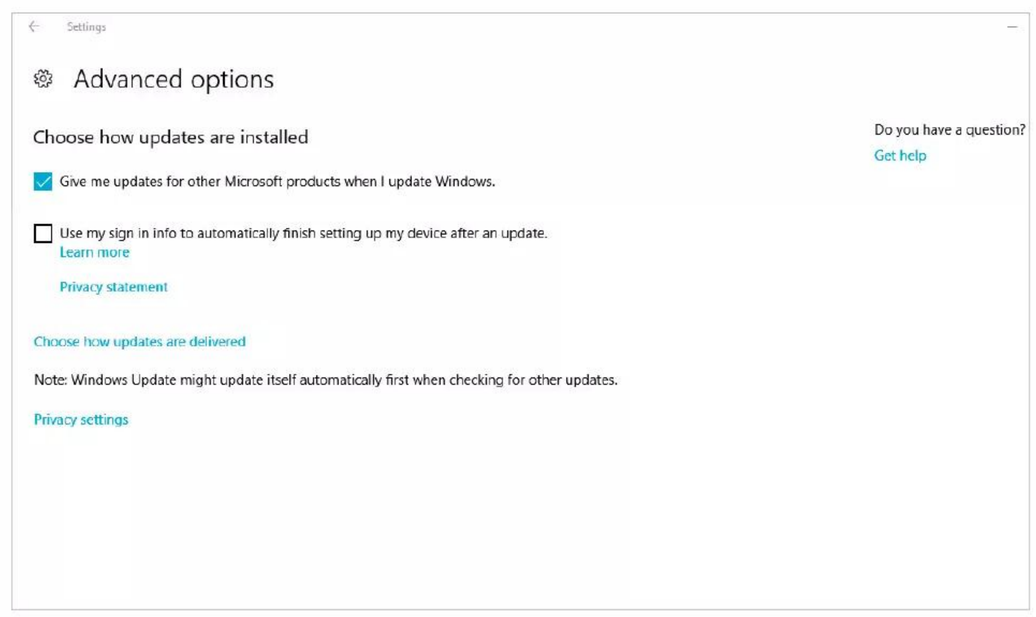
STEP 1 The first port of call is undoubtedly Windows Update. Click on the Windows Start button followed by Settings, the cog icon just above the power icon on the strip to the side. This will open the Windows Settings interface, locate the last entry, Update & Security and click it.



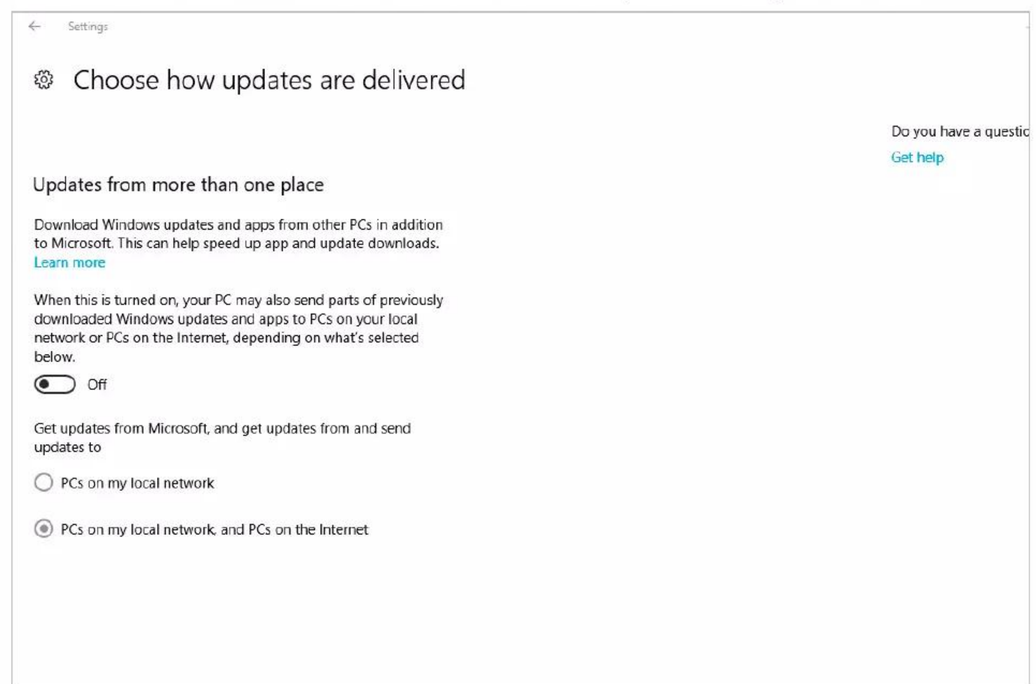
STEP 2 By default Windows Update will automatically check for, download and install updates for the core Windows files. You can check for any on the spot by clicking the Check for updates button; and you can see what's already been updated by clicking the Update history link under the update button.



STEP 3 If you click on the Advanced Options link under the Update Settings section, you can then tick a box that enables Windows to automatically check for updates for other Microsoft products, such as Office and so on. It's recommended to make sure the box is ticked, for better security and protection.

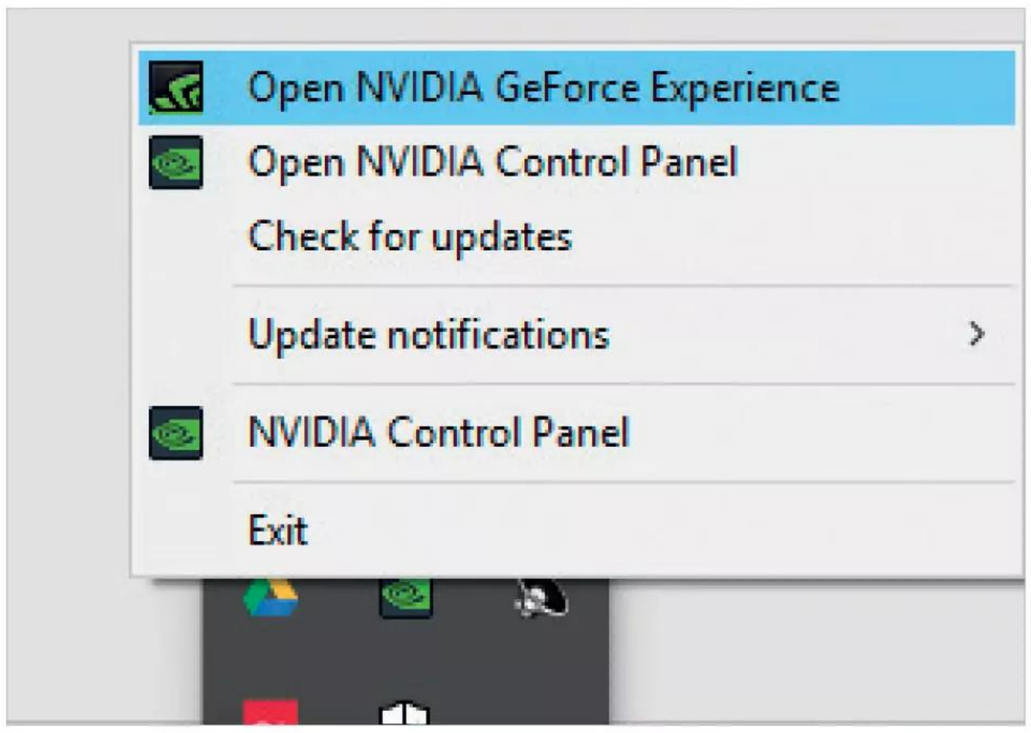


STEP 4 Within the Advanced Options page click the link for Choose how updates are delivered. This page details the way Windows updates can be pushed to other computers on your network, or even the Internet. Whilst it's a grand idea, there are concerns over privacy from some factors of the community. It's your choice but we prefer this option is Off.

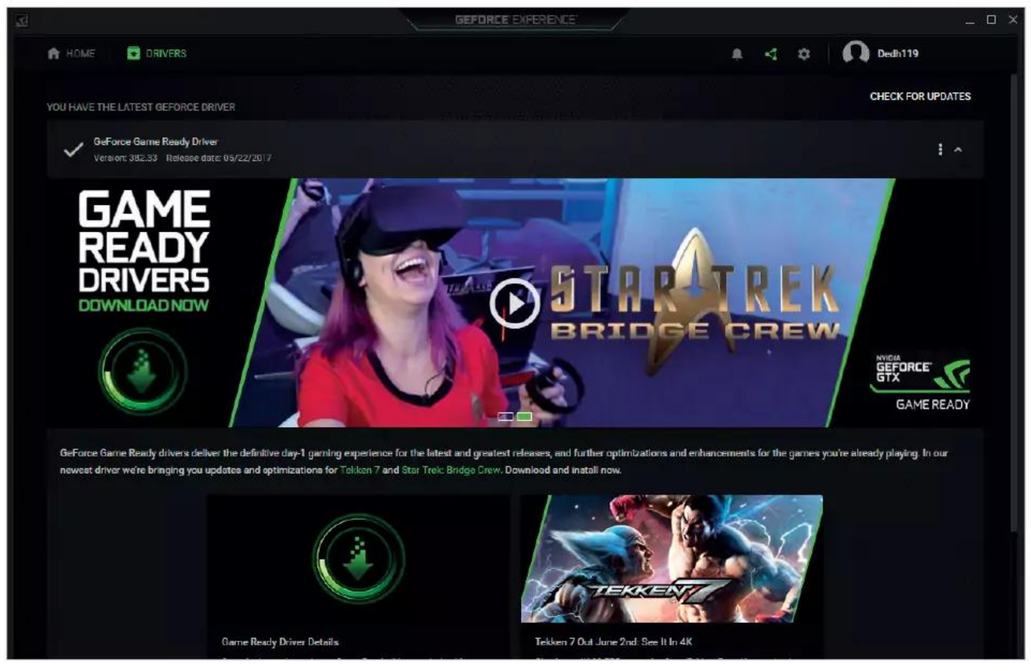


STEP 5 Hardware drivers are usually automatically updated by Windows Update but whilst signed by Microsoft the drivers themselves aren't always the latest versions. Therein lies a problem: even though signed, the MS drivers won't utilise the hardware as well as the driver developed by the hardware manufacturer.

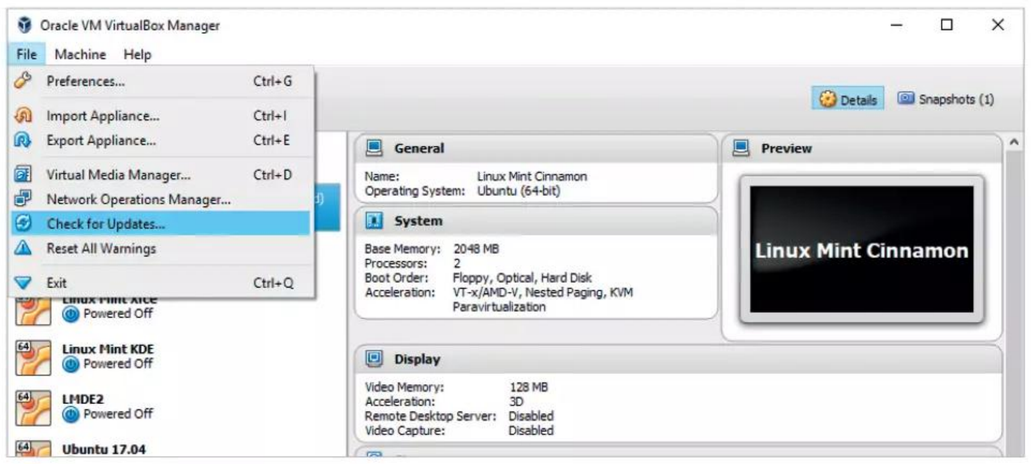
STEP 6 In such cases it's often best to use the hardware manufacturer's driver, as this is more up to date and features security patches as well as performance updates. For example, if you own an Nvidia graphics card right-click the Nvidia icon in the taskbar and select Open Nvidia GeForce Experience.



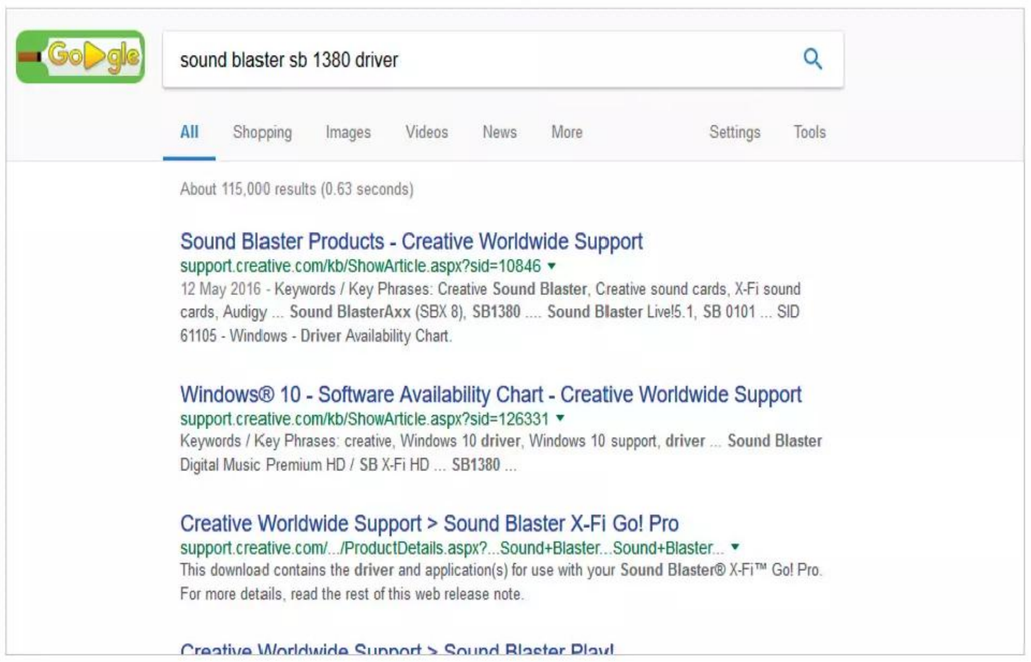
STEP 7 The Nvidia GeForce Experience allows you to improve in-game graphics and check for the latest drivers. Usually this is done automatically, and you are notified of any available drivers. However, If you want to check manually, click on the Drivers tab followed by Check for Updates.



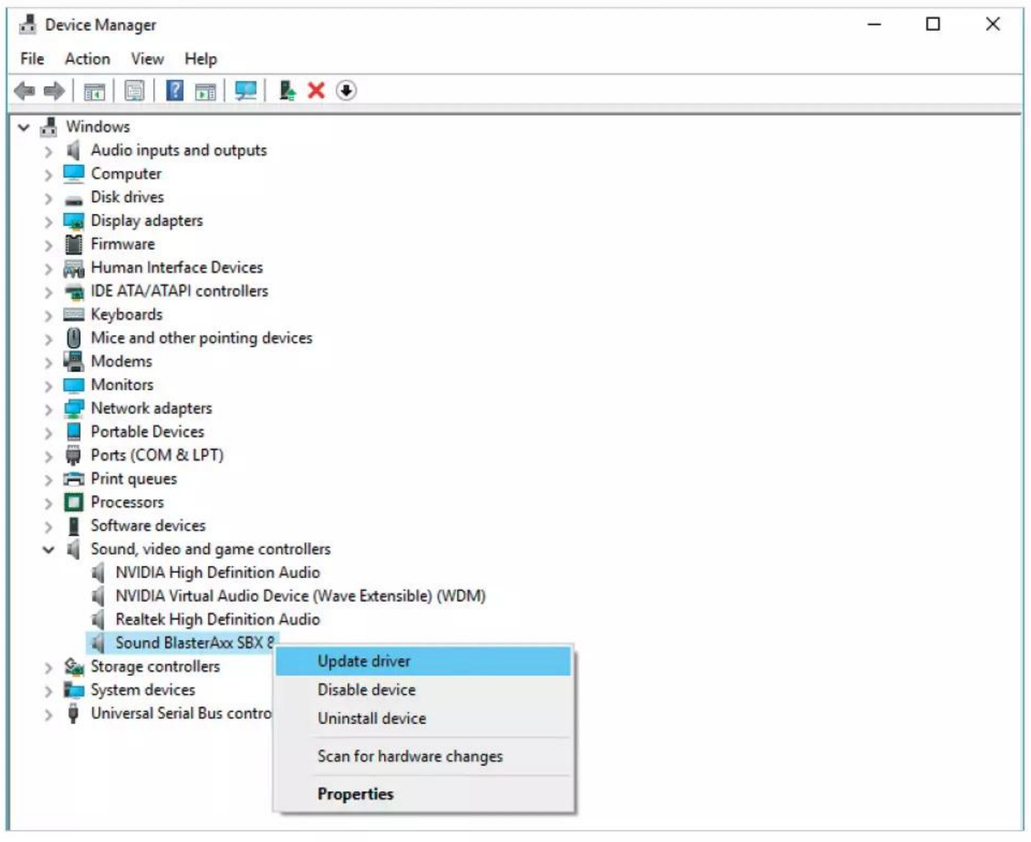
STEP 8 Third-party programs and applications also require regular update checks. Again, this is usually done automatically; when you launch the program in question it often checks for the latest version. If not, look for links such as Check for Updates or similar, usually in the Help, About or even under the File menus of your favourite app.



STEP 9 If you've attached some hardware and Windows hasn't been able to load a driver for it, and there isn't any documentation detailing the driver (this often happens with hardware purchased from eBay and the like), then you'll need to hunt one down. Start by locating the device's product name and number and enter it into a search engine.



STEP 10 You can often force Windows to locate a driver by right-clicking the Windows Start button and choosing Device Manager from the menu. In the Device Manager window, select the hardware you want updating, right-click it and select Update Driver.



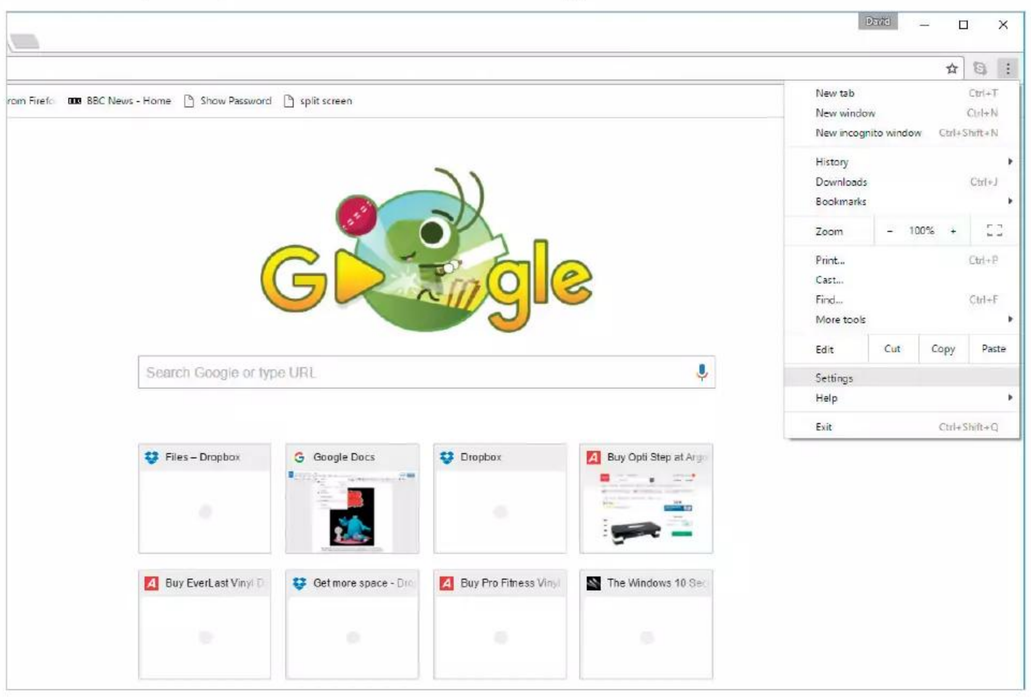
How to Secure Your Web Browser

The web browser is possibly the weakest link in the entire security chain. It's the software product that's on the front line, the one that will inevitably bear the brunt of any Internet attacks and as such, attackers focus a lot of effort on making the browser a portal into your system.

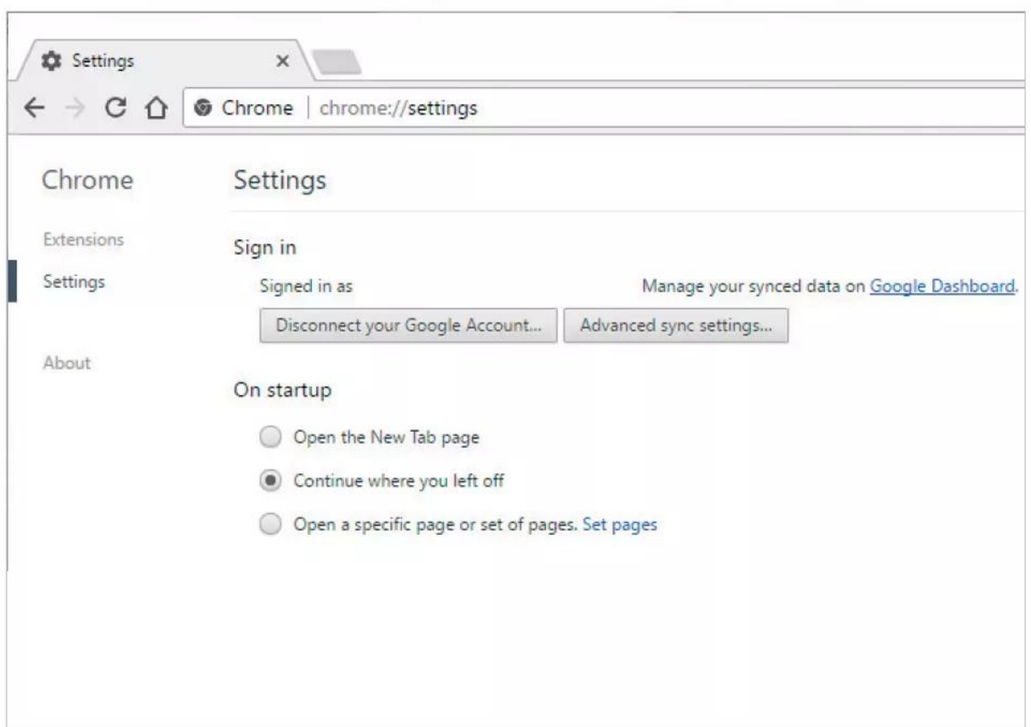
Safer Surfing

Securing your web browser isn't too difficult. There are plenty of options available, including some third-party add-ons you can use to improve security. For this tutorial, we're using Chrome.

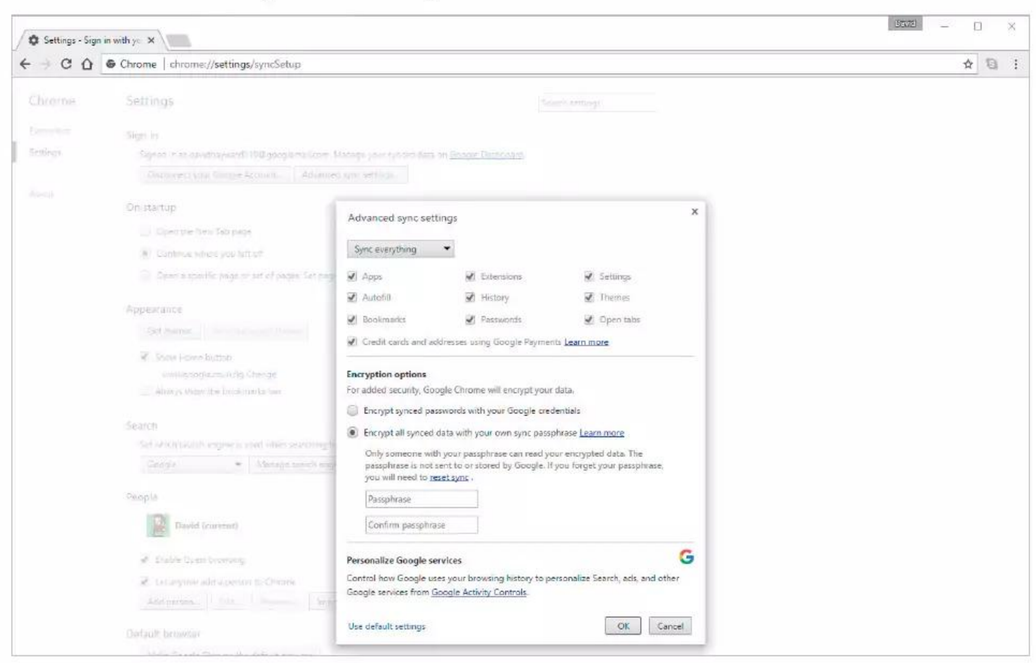
STEP 1 Start by opening Chrome and clicking on the three vertical dots in the top right of the browser window. This is the link to the available options; from the list choose Settings.



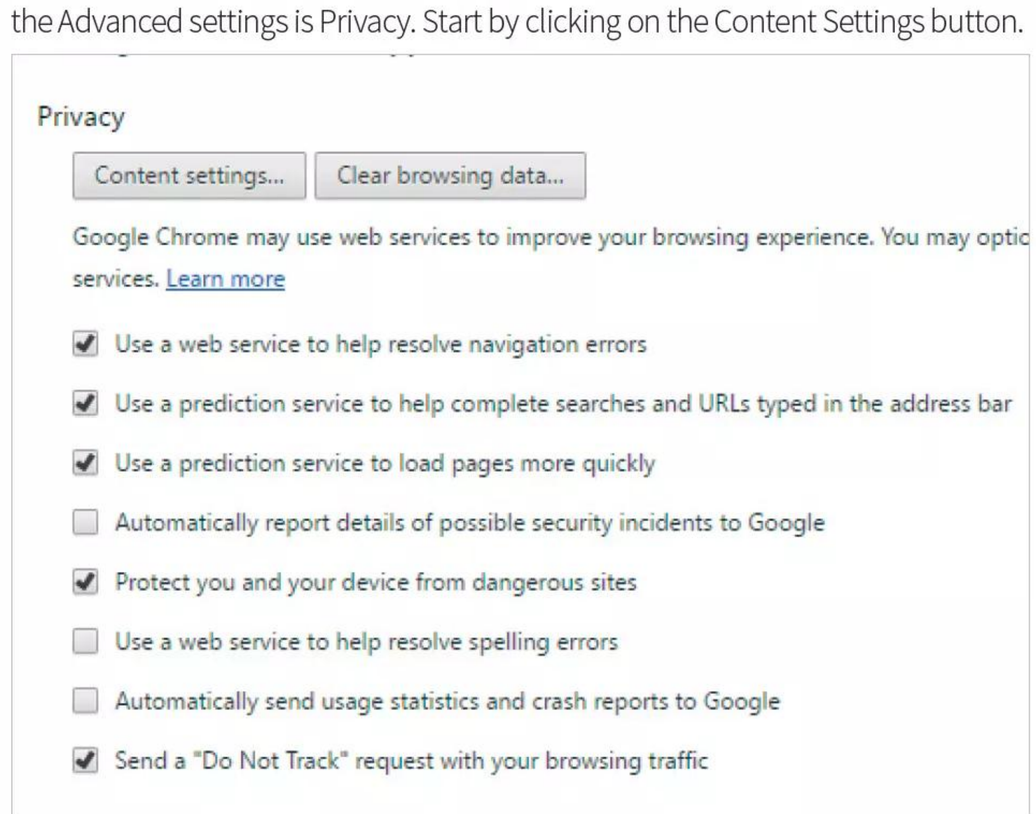
STEP 2 It's generally recommended that you sign into Chrome using a Google account, as this can greatly improve the overall security of the browser. For example, when you sign in, under the Sign In section in Settings, click on the Advanced Sync Settings button, the first option available.



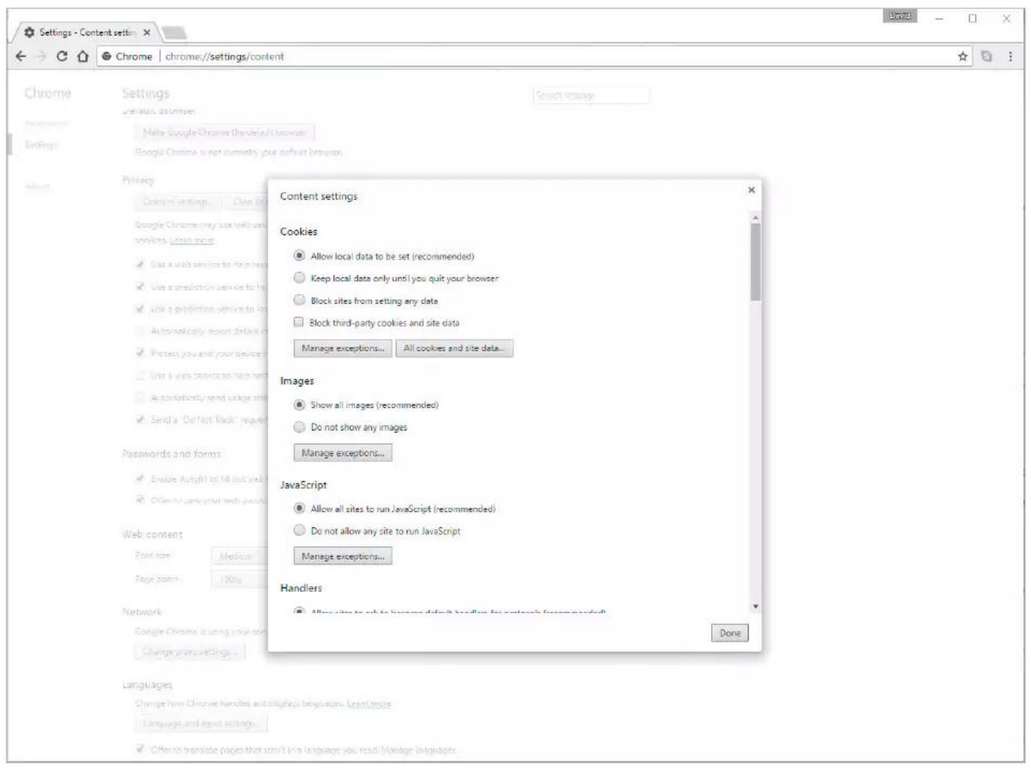
STEP 3 With the Advanced Sync Settings box open, select the option for Encrypt all synced data with your own sync passphrase. Enter a secure passphrase you can remember in the boxes provided and this will enhance the security of all data synced between Chrome and the Internet.



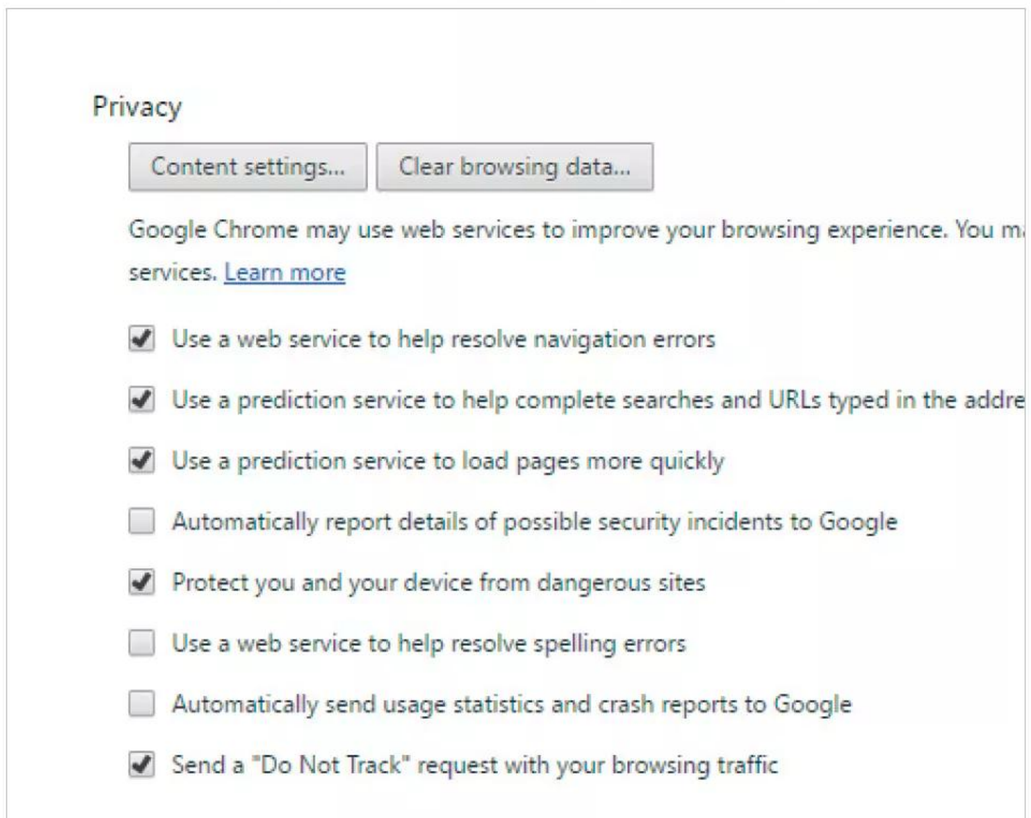
STEP 4 Look to the bottom of the Settings page and click the link for Show Advanced Settings. The first new section to appear under the Advanced settings is Privacy. Start by clicking on the Content Settings button.



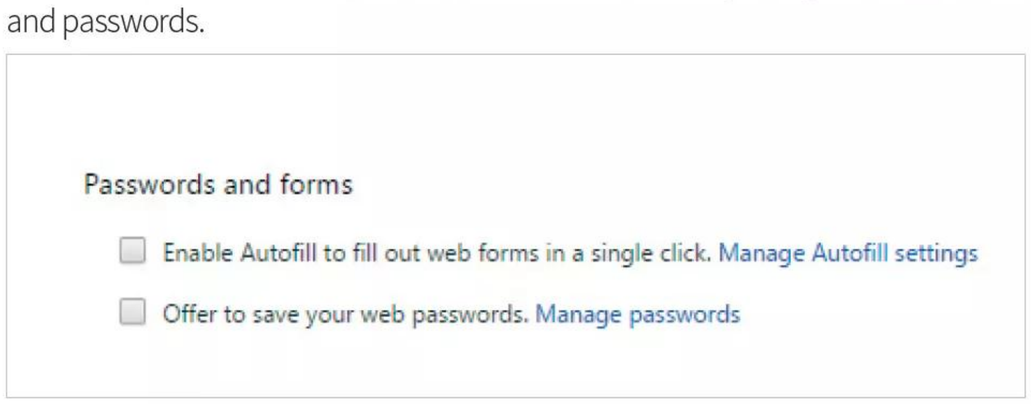
STEP 5 Content Settings allows a greater degree of control over Cookies, JavaScript, Flash, Pop-ups, your computer's microphone and even the webcam. It's an extensive list so we can't go into all the options within this limited space. For maximum security, disable JavaScript and Flash and make sure the mic and webcam are protected too.



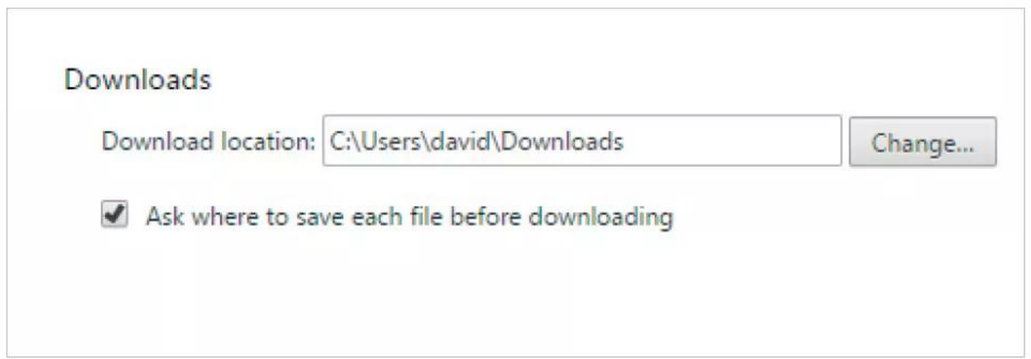
STEP 6 Click the Done button when you're finished with Content Settings, to return you to the Chrome Settings page. Within Privacy still, ensure the last option, Send a "Do Not Track" request, is ticked. This will stop any tracking elements from monitoring your browsing activities.



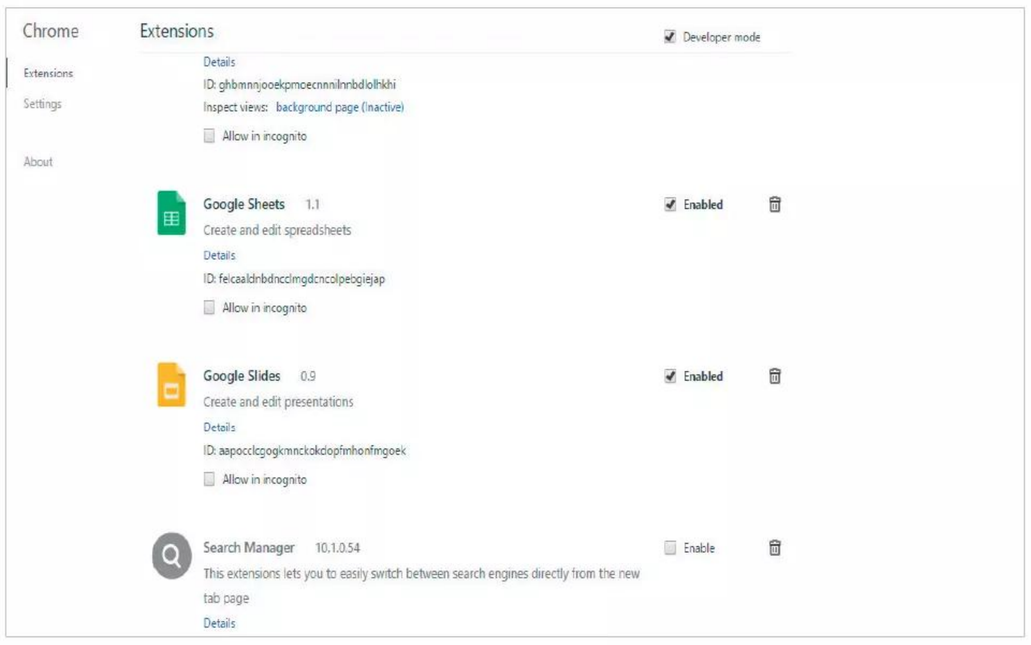
STEP 7 Just under the previous step's tick box, it's also recommended to untick the two Passwords and Forms boxes that offer to enable Autofill and Save your Passwords. Whilst it's a pain to constantly enter passwords, this will stop any hijack Chrome attacks from gaining your usernames and passwords.



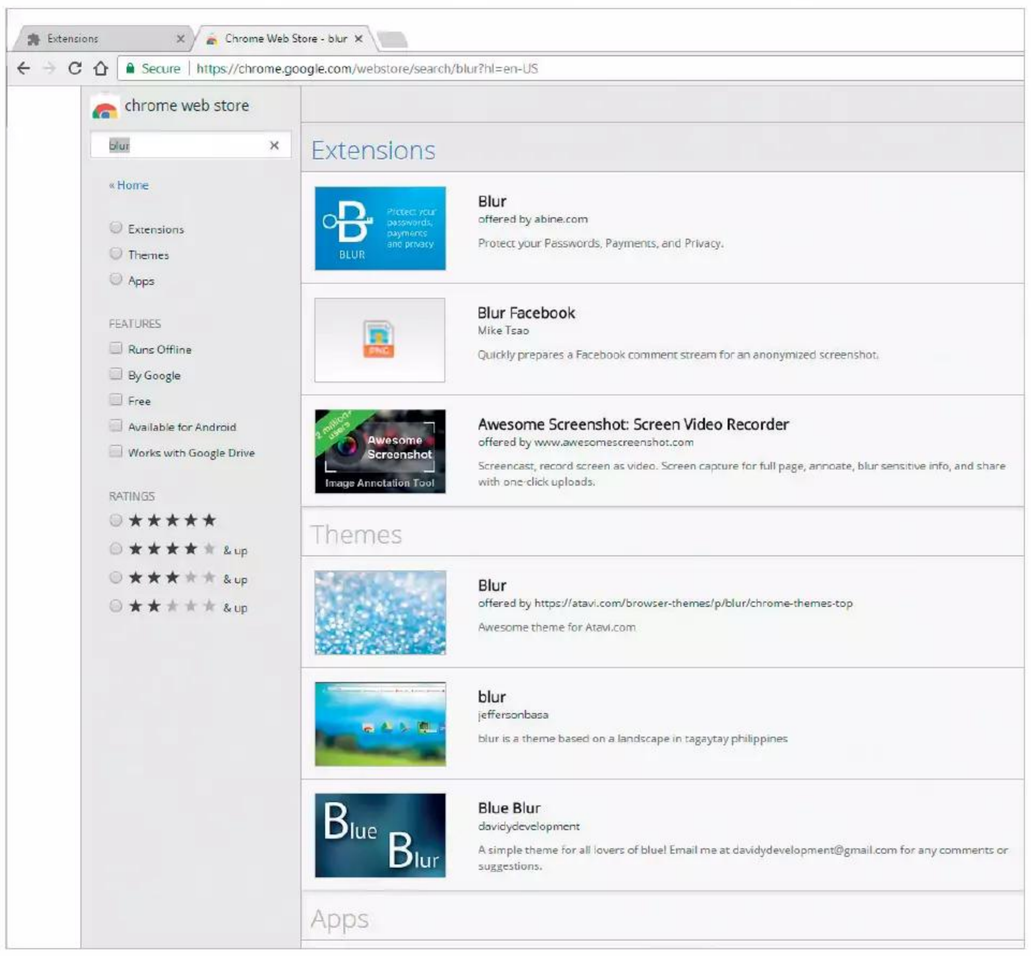
STEP 8 Under the Downloads section, it's an idea to tick the box Ask where to save each file before downloading. Again this can be a bit of a pain for the user; however it stops malicious background downloads from infecting your system, giving you more control and the ability to stop the process.



STEP 9 To the left of the Chrome Settings page you can see links for Extensions, Settings and About; click the Extensions link. With the Extensions page open, scroll down to the bottom and click the Get More Extensions link.



STEP 10 With the Chrome Web Store launched, via the Extensions link, search for Adblock Plus. Within the results, click on the Add to Chrome button on first option for Adblock Plus. This will install an advertising blocker within Chrome, securing you from any threats from Internet advertising. Do the same for Blur (an anti-tracking add-on) and HTTPS Everywhere.



How to Secure Your Home Network

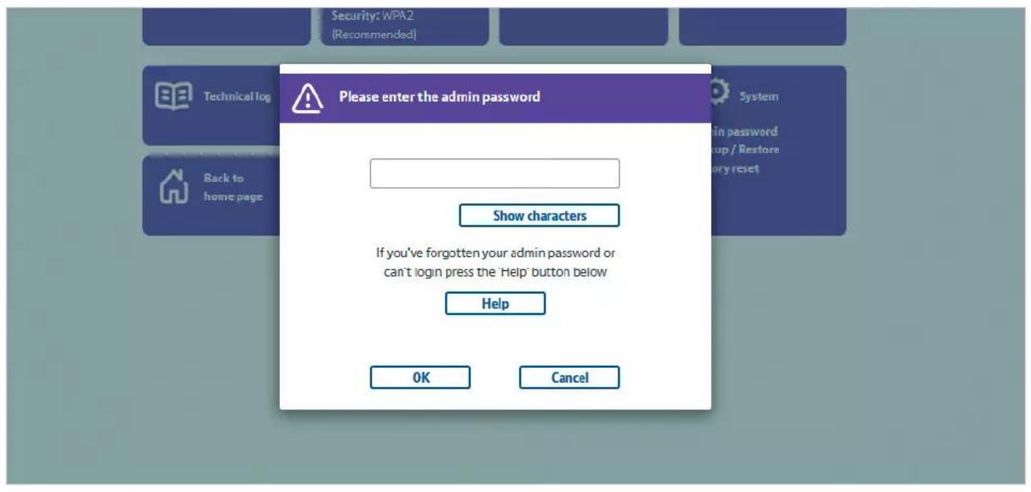
We've mentioned previously that an attack doesn't always come from the other side of the globe but can indeed be a little too close to home at times. Home network hacking is possible with the simplest of tools available on the Internet, often even just tapping into a cable.

Network Protection

Without being too paranoid, it's remarkably easy to get into a neighbour's home network. If you live in a block of flats or you use powerline adapters, you may need to consider these ten steps for better network protection.

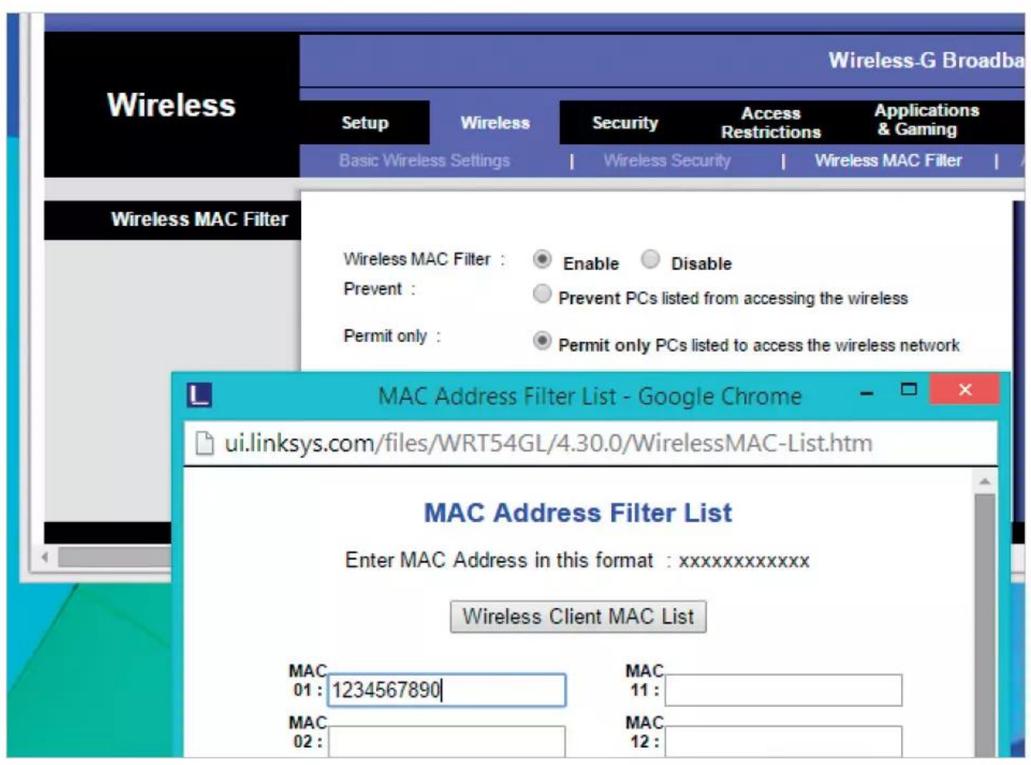
ROUTER PASSWORD

The most common entry point to gain access to your network is via the router. The router from your ISP may well be offering the latest forms of encryption but it doesn't take a genius to trawl the less reputable sections of the Internet to obtain a list of passwords. Therefore, change the default username and password to access it.



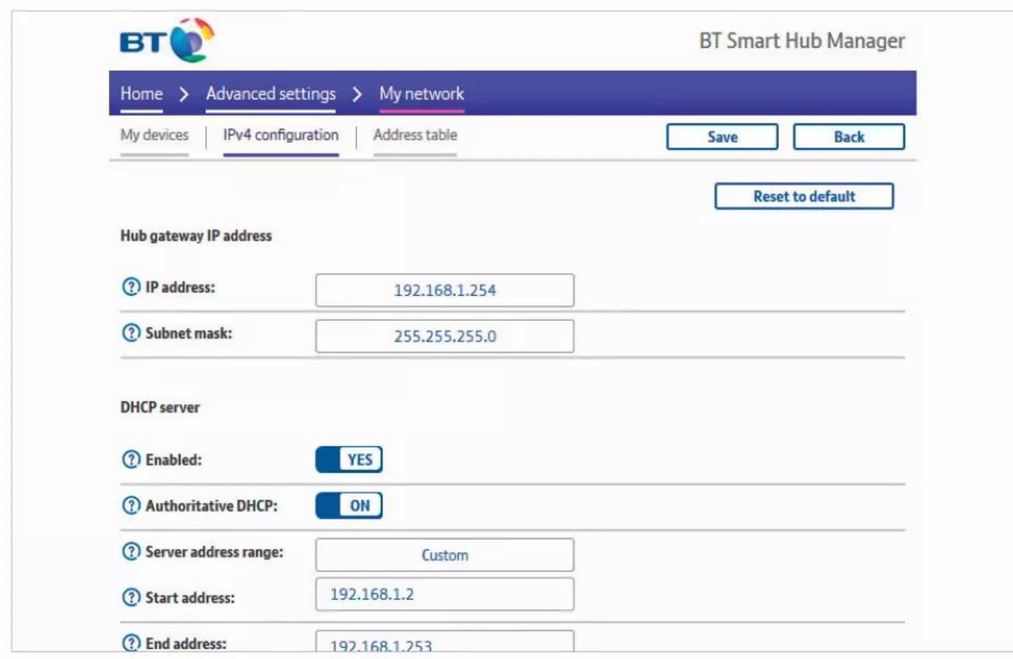
MAC ADDRESSING

Most routers these days come with a form of authentication called MAC (Media Access Code) address filtering. Every networkable device, computers, tablets, games consoles, come with a unique MAC address. The filtering allows you to enter the MAC addresses of your devices, so only they can be used on your router. Consult your router documentation for more details.



DISABLE DHCP

It can be a pain but try disabling DHCP on your router and opting for static IP addresses. Every device that connects to a DHCP router will receive an IP address. By eliminating that you get to specify the address range available. It's not fool proof but it's worth considering.



POWER OFF

According to Trustwave's 2013 Global Security Report, many home network hacks are conducted when the household is away or asleep. This leaves the hacker with ample opportunity to steal bandwidth and view files you may have on a NAS drive. The short, simple solution is to power off the router at night and if you go out for the day.

POWERLINE ENCRYPTION

Powerline adapters are an excellent resource for connecting wired network devices, without trailing lengths of cable around the home. However, depending on the adapter, it is possible to use another adapter to gain access to yours. Newer homes are common where you're able to pick up another network, so use the encryption button if the adapter has one.

ETHERNET CABLES

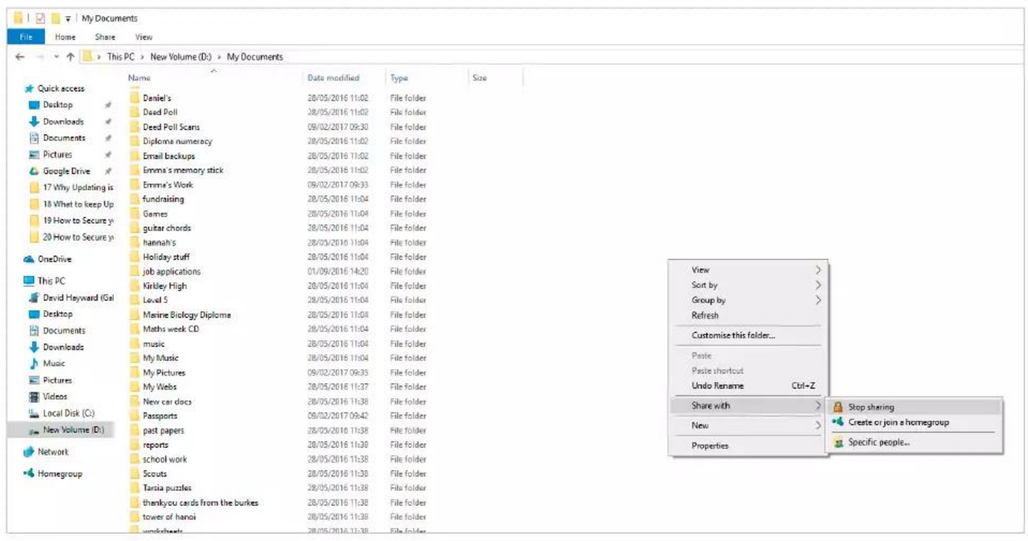
Cabling a home with Ethernet isn't a difficult project, this offers faster connection speeds than that of wireless; but if you're living in shared accomodation or a flat block, make sure that any unseen cable lengths can't be access by a neighbour. It's easy enough to splice into an Ethernet cable and steal bandwidth.

NETWORK MAPPING

Consider using a network mapping program, such as Open-AudIT, to gain a better understanding of what devices are attached to your network. Become familiar with the addresses, manufacturer, model IDs and so on of every connected object. That way, should anything new appear, you'll know it's not something you allowed.

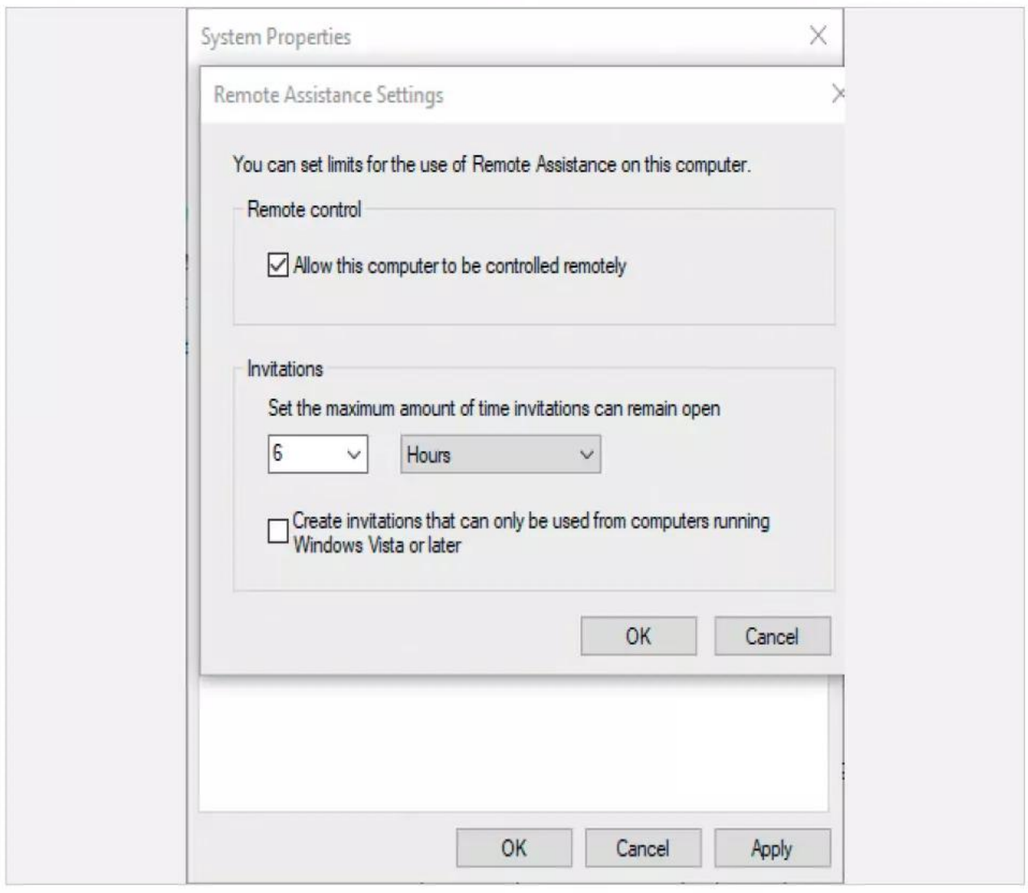
SHARE LESS

Sharing resources and files from one computer to another is perfectly fine but consider sharing less if you live in close proximity to others. Once a hacker has gained access to your network, getting to any shared folders you have will be a doddle. In extreme cases don't share anything but generally tighten password control.



REMOTE ACCESS

Remote administration on both the router and computer certainly help you out when you're not at the keyboard. Perhaps you connect to your home network from work? Whatever the reasons, it does leave a potential gap in your home network security. Consider closing it completely or double-checking the authentication is top notch.



VISIBLE PORTS

If you run a small office make sure that all your wall ports are located in areas where they are secure. Behind desks and generally away from where the public or any visitors may be able sneakily plug a laptop in.

What are Wireless Security Standards?

Wireless security has adhered to a number of standards since 1999, each improving over the last due to the ability for a then-modern computer to hack the security levels behind them. Tighter controls are needed as computers and the way they connect have become increasingly more complex.

WEP, WPA, WPA2, IEEE…

Amid the confusing acronyms lies a logical progression of wireless encryption and security protocols. Whilst at first they seem bewildering, it's quite interesting to learn of their history.

The technology behind delivering a wireless network has evolved over the last couple of decades and so has the ways and means in which to secure it all. It's not just simply down to choosing a password that no one is likely to guess, you need to make sure that data and connection to a wireless network is encrypted to the highest possible standard.

These standards are always moving forward and like most elements of the technology industry they come with a bewildering cocktail of acronyms and meanings. Encryption and all things security can be a confusing topic, even for experts. Here are the current, and most important, terms you should be familiar with when talking about wireless security standards, wireless networking and the hardware that lies between your wireless communications.

IEEE

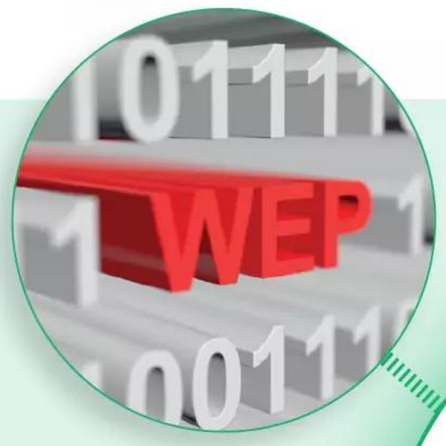
The Institute of Electrical and Electronics Engineers is the organisation responsible for setting the entire wireless security industry, and data communications standards. It was founded, surprisingly, back in 1963 and is regarded as the largest association of technical professionals in the world.

802.1x

You've no doubt come across the numbers 802.11 when looking at wireless-based and networking documentation but what on earth does it mean? 802.1x is the IEEE standard for providing authentication and controlling user traffic across wireless and wired Ethernet-based networks. It's an ideal application for providing authentication for wireless networks, as it requires very little processing power from the authenticator: the actual wireless access point. The better the standard, ending with a, b, g, n, ac and so on, the higher the speed of communications between devices.

WPA2

WPA2 is the upgraded standard security technology of WPA. It's designed to offer the user an impressive 256-bit encryption key, which is virtually uncrackable unless you're a secret research lab with a few billion dollars to spare on quantum computing and dedicated hardware decrypting processors. There are also different sub-standards within WPA2, with AES (Advanced Encryption Standard) and TKIP (Temporal Key Integrity Protocol), both of which are encryption methods, along with the lesser used CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol).



WEP

This is the original wireless encryption security standard, Wired Equivalent Privacy. Whilst the protocol worked for the late nineties wireless networks, it was soon overshadowed by the ever increasing power of the average computer. WEP uses a 40-bit standard encryption key, which is a key consisting of either 10 or 26 hexadecimal digits. That sounds like a lot of possible keys to crack but a modern, powerful computer would be able to break 40-bit encryption in around 30 seconds; compare this to months for a computer in the late '90s.

Access Point

Talking about access points, this is the hardware that acts as a receiver or transmitter for the wireless signal and network. It can physically be a number of different components, such as a router, switch or powerline adapter but essentially it's the hardware that converts a wired Ethernet network to a 2.4GHz or 5GHz wireless signal and vice versa; it's also referred as the WAP, Wireless Access Point.

WPA

Replacing the WEP standard, WPA (Wi-Fi Protected Access) provided a much needed improvement for the ever advancing march of security. It became the standard in 2003 and offered the user either 64-bit or the more adept 128-bit key levels of encryption. A 64-bit key attack would take several lifetimes when it was first introduced; these days it's estimated that it would take several months, maybe less if the attacker used several computers working as a cluster. Naturally 128-bit key lengths are mind-numbingly more complex and even by today's standards, the theoretical process of a brute force attack would take more time than the universe has estimated left to exist. Which is a very, very long time.

How to Secure Your Wireless Network

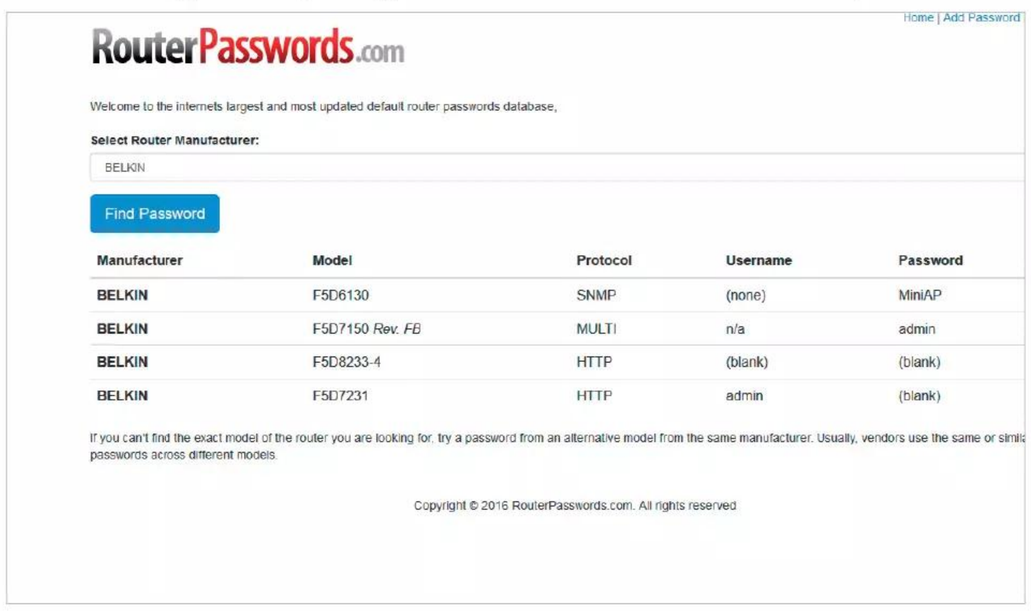
It may seem a little far-fetched but it's not unfeasible for a hacker to sit outside your house with a tablet or laptop and gain access to your home network via the router's Wi-Fi signal. Understandably it's quite rare but it's worth considering beefing up your protection.

Wi-Fi, Lock and Key

A lot of the standard tips on protecting your Wi-Fi merge with those of protecting your wired network. It's common sense mostly and keeping an eye on what's going on in your own network.

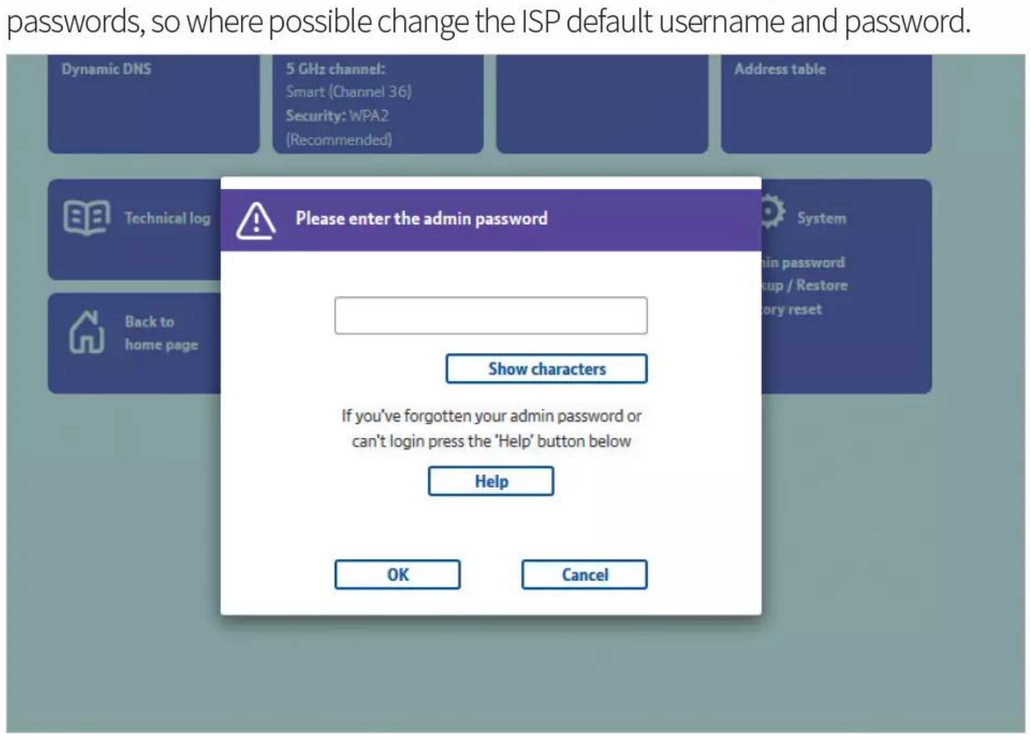
ADMIN PASSWORD

All routers come with a generic username and password. Depending on the model and manufacturer of the router, it's surprisingly easy to get hold of the username and password. For example, view www.routerpasswords.com and choose your router. With that being the case, change the administrator username and its password.



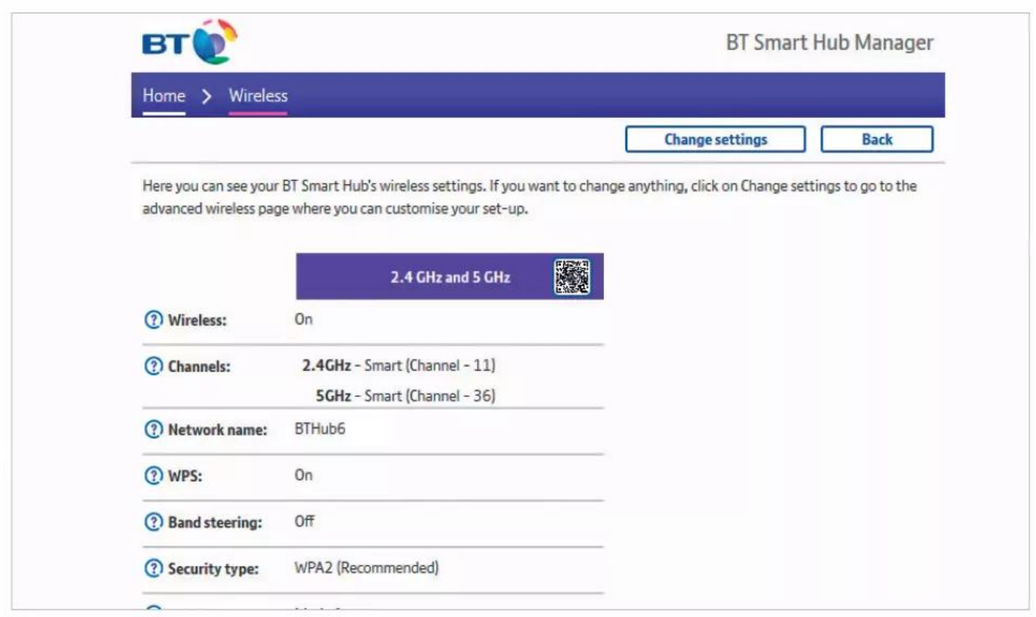
ISP PASSWORD

ISP supplied routers tend to have their own set of usernames and passwords. Although these are more secure than that of the default set, they are still obtainable from the more dubious quarter of the Internet. A potential hacker will easily be able to get hold of sets of passwords, so where possible change the ISP default username and password.



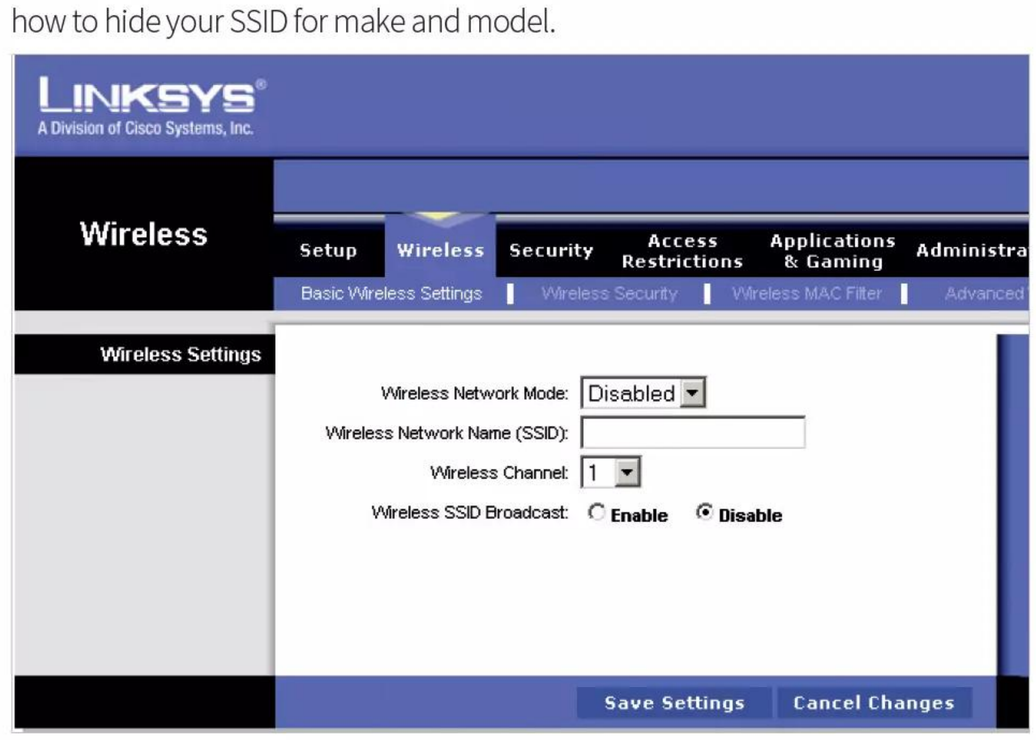
CHANGE SSID

The Service Set Identifier (SSID) is the name of the router that's broadcast so you're able to locate and connect to it. Most routers will display the name and ISP, or the make and model, making it easier for a hacker to find the information they need to gain access. It's recommend therefore to frequently change the SSID.



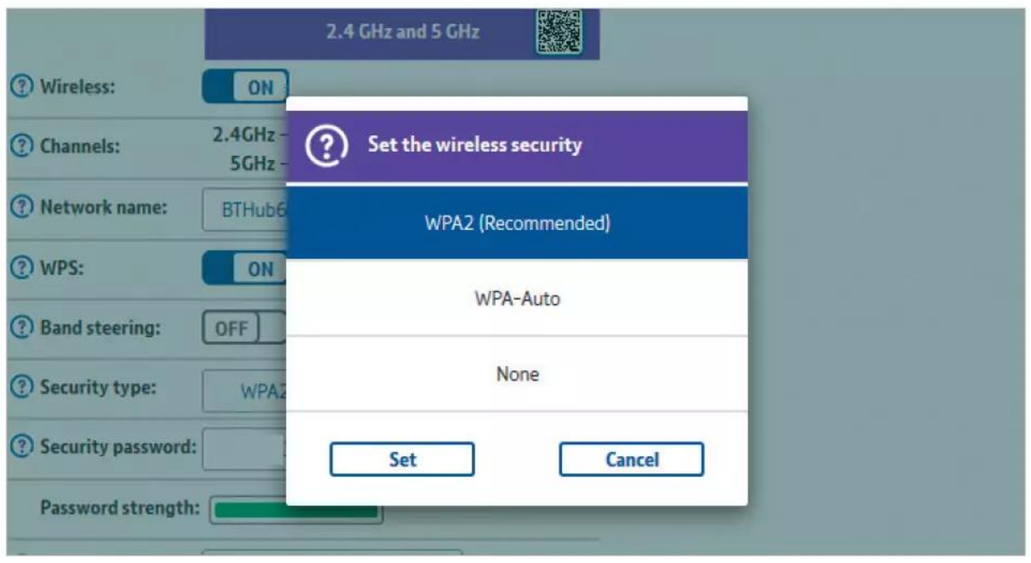
HIDE SSID

It's also possible to select an option to hide your SSID from being broadcast. Whilst this doesn't stop it being hacked, it does make it a little more difficult for someone who's casually looking around for networks to access. You'll need to consult your router documentation to find how to hide your SSID for make and model.



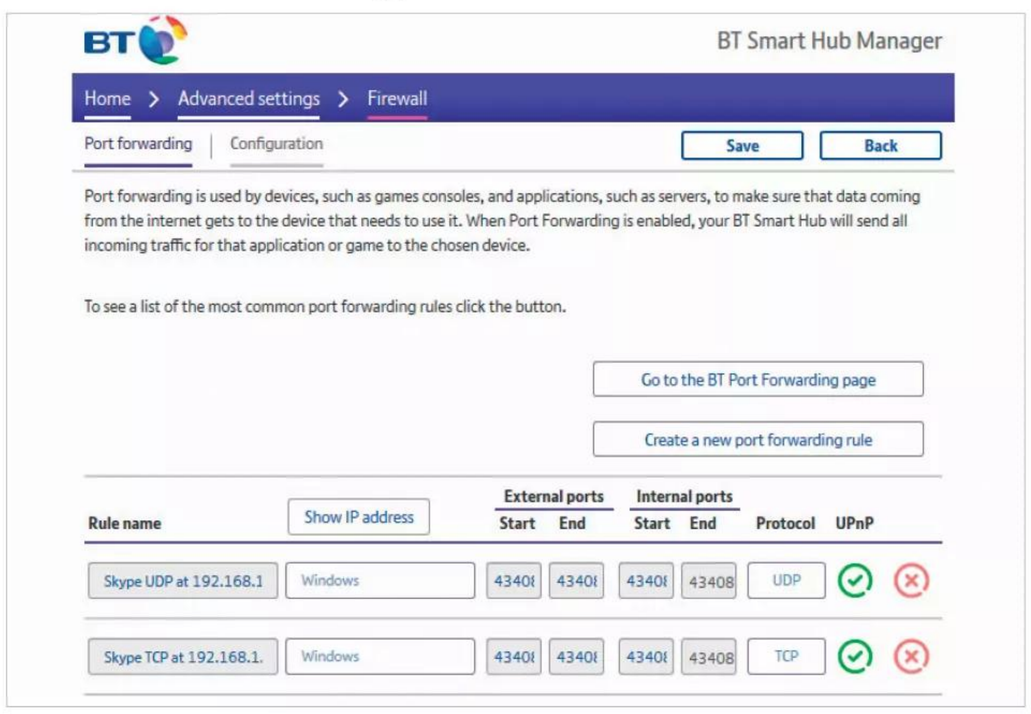
USE WPA2

Most modern routers will already come with the latest security standard enabled, WPA2; but there are instances of some routers defaulting to a lesser security type for the sake of device compatibility. It's essential that you ensure your router is using the latest and best form of encryption for your protection.



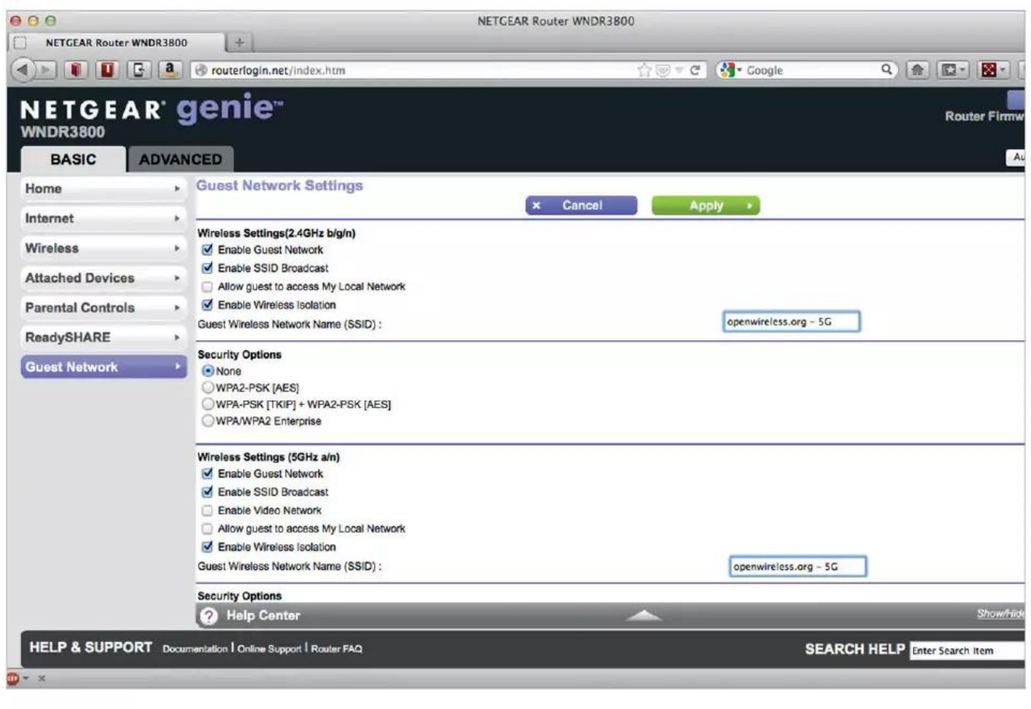
ROUTER FIREWALL

The firewall that comes with Windows is good but the firewall from third-party AV software is even better; and for extra protection, make sure that the router's firewall is enabled and doesn't have any potential leaks.



DISABLE GUEST

Some routers come equipped with the ability to allow a guest network. This enables users to connect to the router without requiring an encrypted password. Obviously this is a potential huge gap in your home network security. If you have no need of a guest network, then look to the documentation on how to disable it.

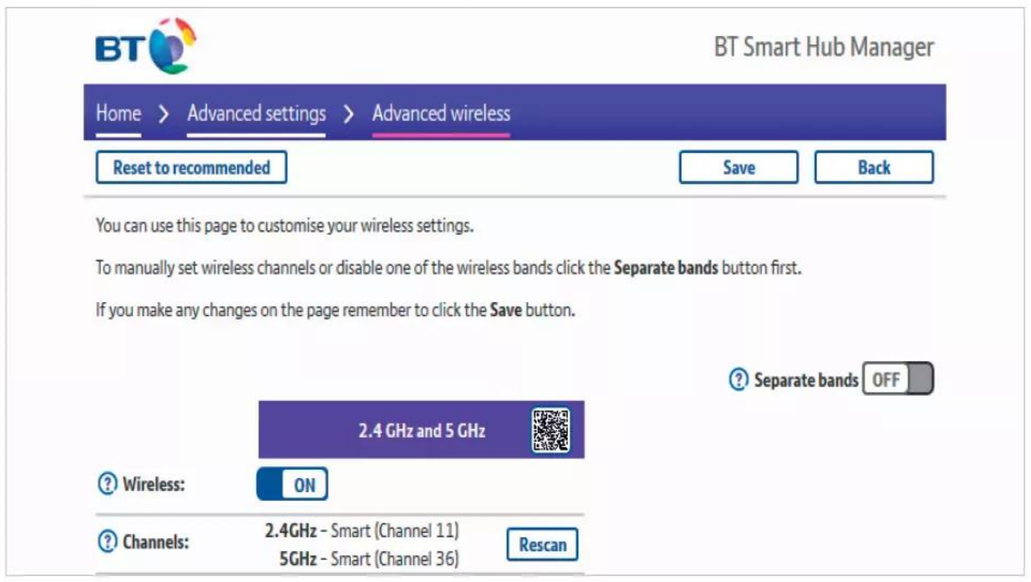


ROUTER RELOCATION

Most users will have their router located in the living room, near the master phone socket. This means that not only will the router broadcast through the house, it's also broadcasting over much of the street in front. Consider placing the router in a more central location of your house. This offers great coverage, whilst limiting its signal reach beyond.

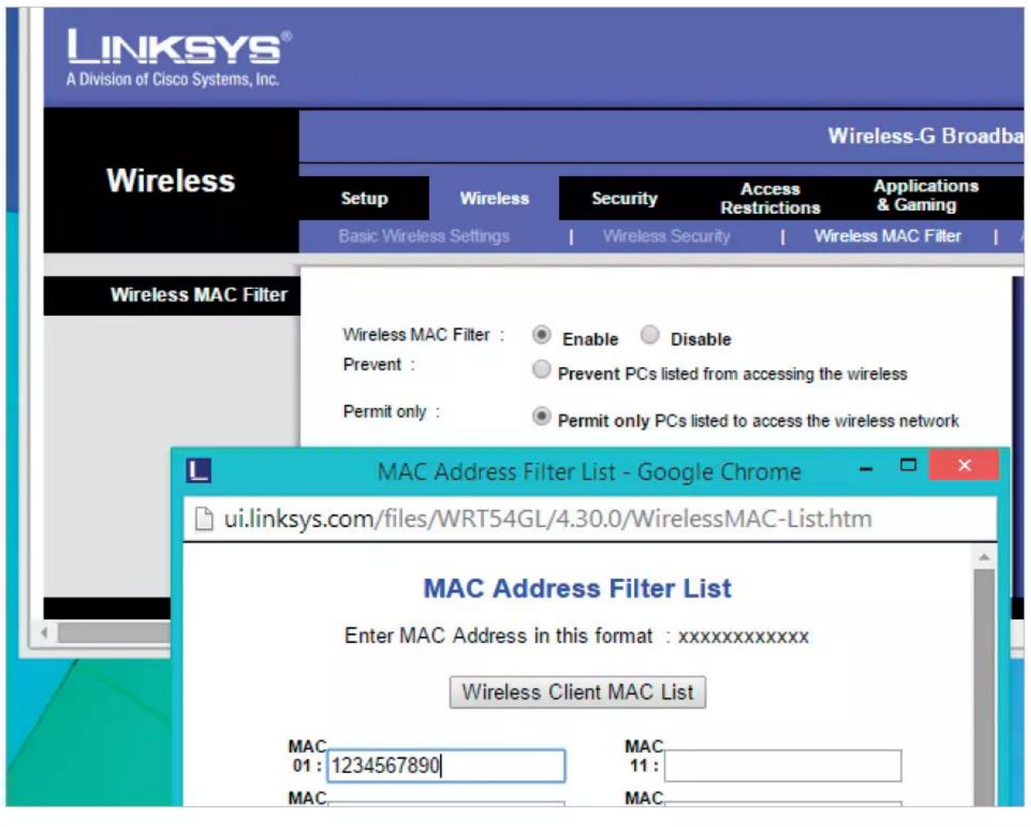
DISABLE WPS

The WPS button on a router and a device will allow easy pairing of the two without the need to enter the encryption password. This is certainly convenient but someone who may gain physical access to your router will be able to pair their own device. Look to turning off WPS in the router's settings.



MAC FILTERING

Filtering MAC addresses was discussed previously but it's worth repeating with regards to wireless network security. By filtering those devices that are allowed to connect to your router, and keeping an eye on what's connecting, you're able to control your security to a far higher degree than usual.



What is Encryption?

We've mentioned encryption and its impact on your privacy and security, but what exactly is it? The definition of encryption is 'the process of converting information or data into a code, to prevent unauthorised access'.

Kryptos Communications

To better understand encryption it's worth taking a moment to learn about its origins, how it's been developed over the years and how it applies to our modern communications.

The word encryption comes from the ancient Greek word Kryptos, which means hidden or secret. Interestingly, the use of hiding messages from others can be traced back to early Egyptian scribes who inserted non-standard hieroglyphs within other communications in order to hide the message from casual viewers. According to historians the Spartans used strips of leather with messages engraved. When the strips were read they were meaningless but when wrapped around a staff of a certain diameter the characters would be decipherable.

Of course, the modern forms of encryption are far more advanced but the overall core concept has remained the same: to be able to send a message to others without anyone else being able to decipher it. However, modern encryption now requires more than simply sending coded messages. Not only is confidentiality required, encryption must perform a level of authentication, so the origin of the communication can be verified; integrity of the communications, where both the sender and those who receive the communication can be ensured that the message hasn't been altered in between; and some form of nonrepudiation, where the sender cannot deny having sent the communication in the first place.

During the early digital age the only users of encryption were the government and military, and as such between them they created a set of algorithms and standards to protect the communication on the battlefield and from one government agency to the next. These algorithms grew in complexity as technology advanced and it wasn't long before the military-based forms of encryption were being used in commercial modes of communications. Within a few short years, bank transfers, cash withdrawals and data sent to and from modems began utilising these new protocols to protect sensitive information.

Today we're regularly seeing and using devices that boast 'military grade 256-bit AES' forms of encryption, a standard that is regarded as nearly impossible to break without spending billions on specialist hardware and software. In plain English, the modern form of encryption takes data and passes it through an algorithm together with a key. This creates a garbled file of characters that can only be clearly read if the correct key is applied to decrypt the data. Algorithms today are divided into two categories: symmetric and asymmetric.

Symmetric key ciphers use the same key to both encrypt and decrypt data. The most popular symmetric cipher is AES (Advanced Encryption Standard), developed by the military and government to protect communications and data. This is a fast form of decryption that requires the sender to exchange the key used to encrypt the data with the recipient before they're able to read it.

Asymmetric key ciphers are also known as public-key cryptography and utilise two mathematically linked keys, public and private. The public key can be shared with everyone and is usually generated by software or provided by a designated authority. The private key is something that's usually only known by the individual user. Interestingly both types of keys can be applied, where one user has a public key and another a private key, which can be combined to form a shared encryption level.

These keys are many characters in length, proving it nigh impossible for someone to Brute Force hack them. The Brute Force method involves using a program on a computer to try every possible combination of a key until the correct one is found. In the case of the 256-bit encryption, it would take 2^{256} different combinations to break the key. If you were able to force one trillion keys per second, it would still take you somewhere in the region of 10^{57} years in order to crack 256-bit encryption. However, a powerful computer can probably manage around two billion calculations per second, so in theory it would take 9.2^{50} years for your standard desktop to crack it. Take in mind that the universe has theoretically only been in existence for 1.4^{10} years.

Numbers as big as that are generally far too mind-boggling to comprehend. Suffice to say that if you're able to use 256-bit encryption for your communications or to protect your data, then you're going to be protected for at least seven times the current age of the universe.

> *Encryption is the act of protecting your data from prying eyes*

"Forms of encryption can be traced as far back as ancient Egypt, using non-standard hieroglyphs."

"Making data impossible to read is just one step, you also need the key to decrypt that data."

"The universe is 14 billion years old, but it would take seven times that time to crack 256-bit encryption."

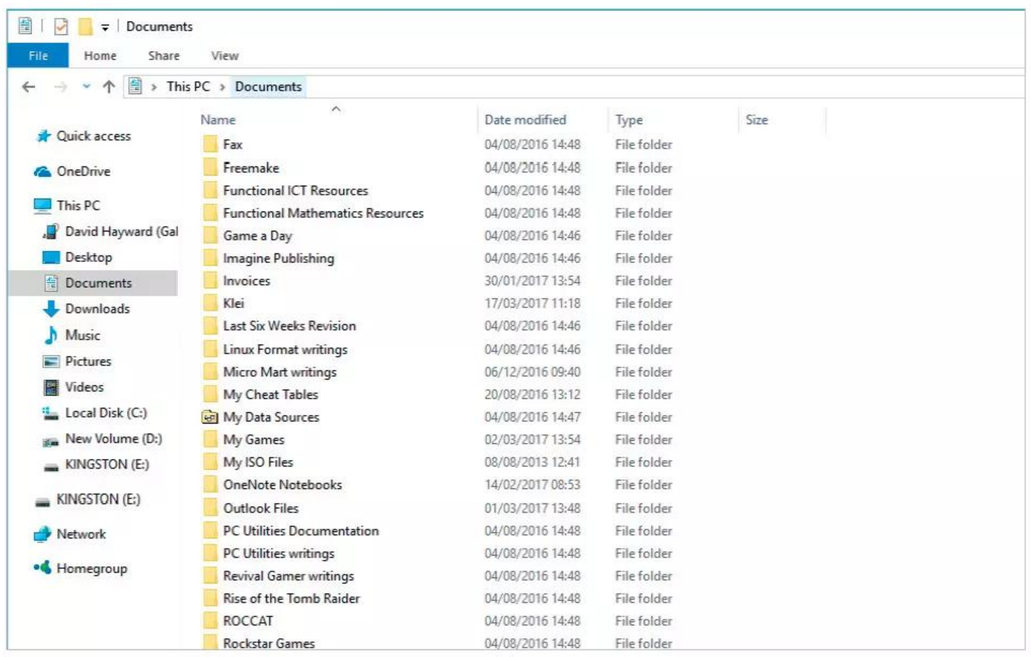
Encrypting Your Windows Laptop

Windows comes with Microsoft's BitLocker program to encrypt the file system; however, Windows Home versions do not have this feature. Thankfully there are many encryption programs available for download, we're using DiskCryptor in this tutorial.

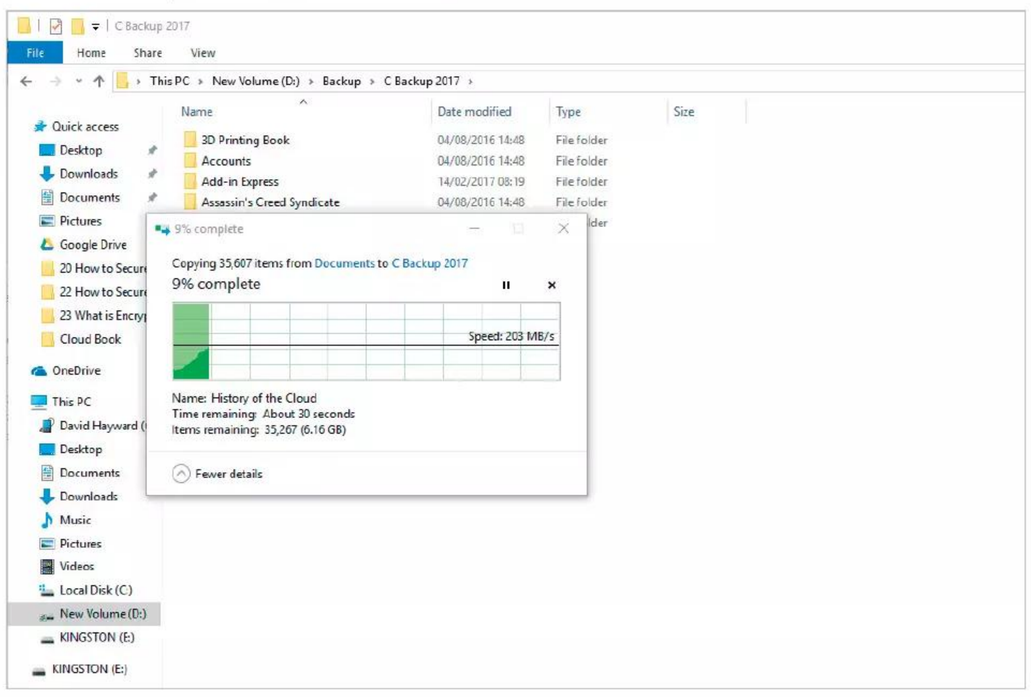
Windows, Under Lock and Key

We're going to encrypt a 2GB USB flash in this example, purely for ease of use and to demonstrate how you can encrypt your entire laptop hard drive(s).

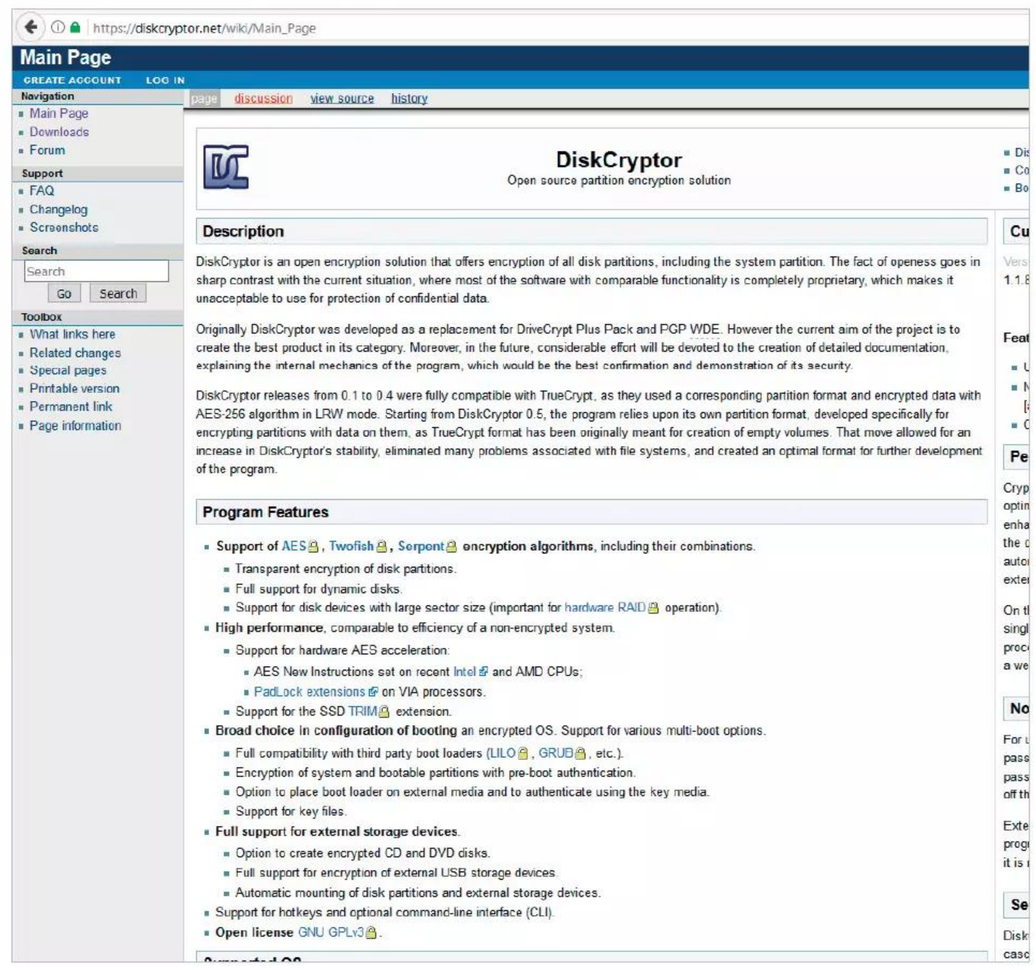
STEP 1 Encryption doesn't affect the core data, other than making it impossible to read without the decryption key but it's always worth making sure you have a backup of all your data prior to any system related changes. If you store your work or data in the Documents folder, then start by opening it in Windows Explorer.



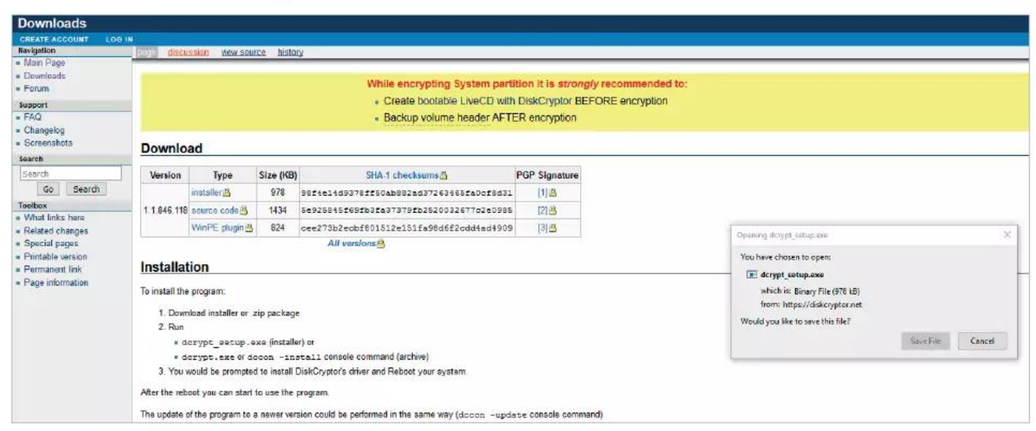
STEP 2 Press Ctrl+A to highlight all the files, then press Ctrl+C to copy them to the clipboard. Next, choose a suitable backup location such as an external or network drive and when ready, press Ctrl+V to paste the copied data into the new location. Then, should something go wrong, you have a recent backup of your most used data.



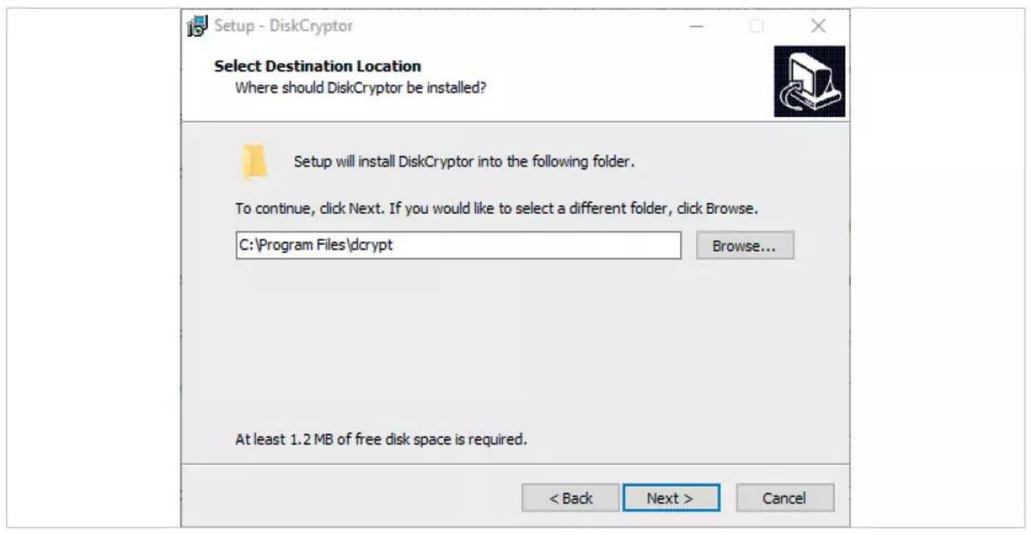
STEP 3 It's always best to ensure safe data before commencing with anything like this. It's also always worth doing (as we are) a test of the software first, on a disk that you don't mind messing up should you get the process wrong. Let's start by navigating to the DiskCryptor homepage, at www.diskcryptor.net/wiki/Main_Page.



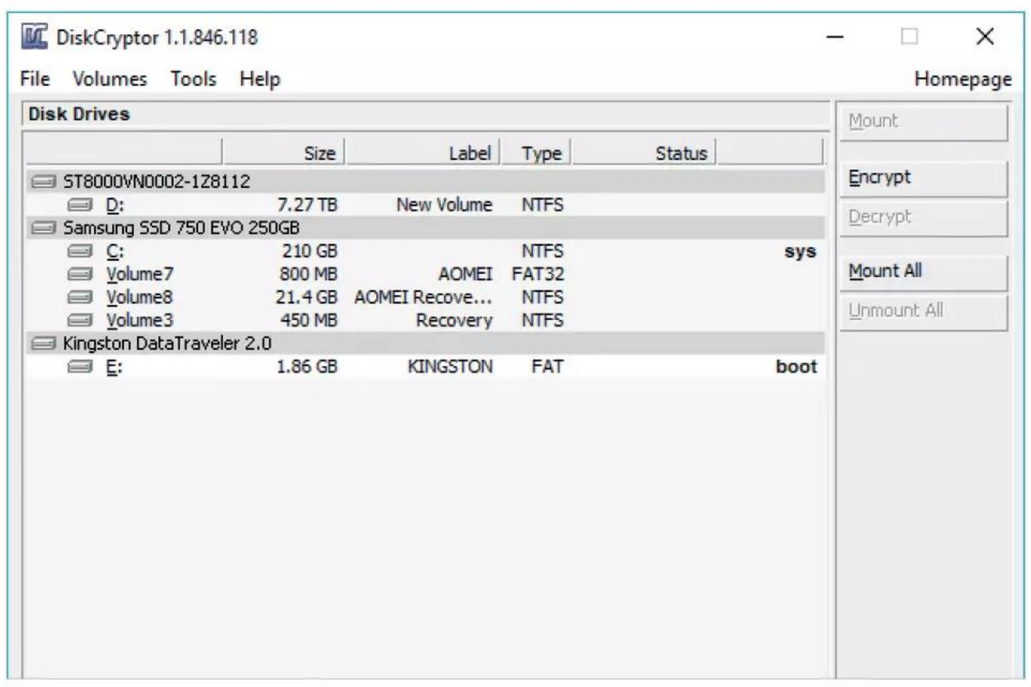
STEP 4 Using the menu to the top left, click on the Downloads link. Look for the latest version in the Download section and click the link for the Installer. This will open a confirmation box, click the Save File button to download the DiskCryptor executable file.



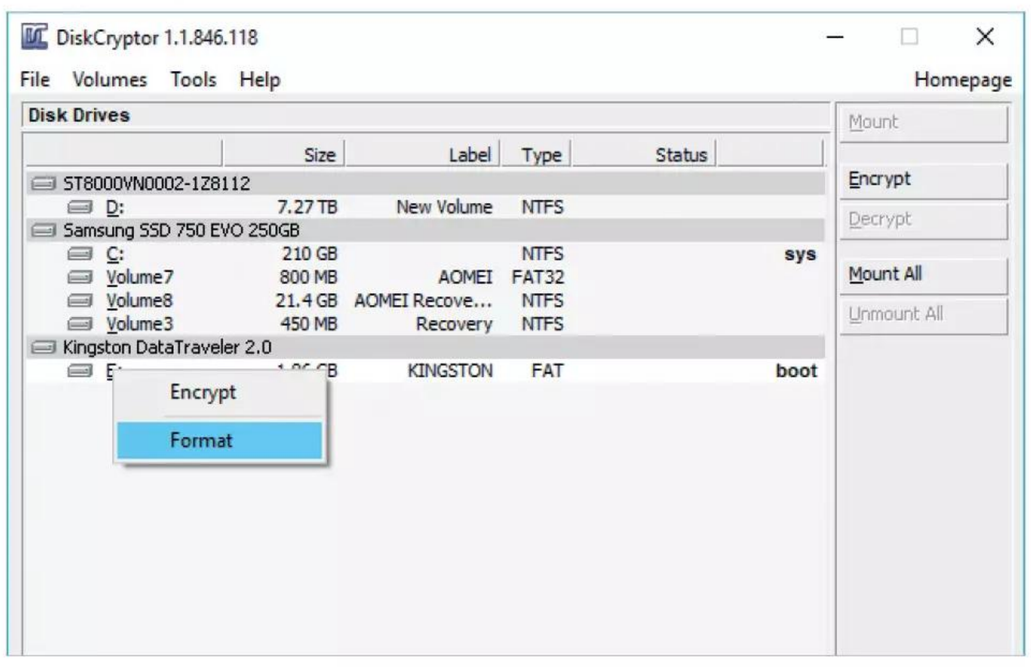
STEP 5 The dcrypt_setup.exe file should now be in your Downloads folder. Double-click it and select Yes to accept the Windows confirmation. With the DiskCryptor setup window open, click the Next button and accept the license agreement on the following page. For the remainder of the options choose the defaults, clicking Next. When done, click the Install button and reboot the computer.



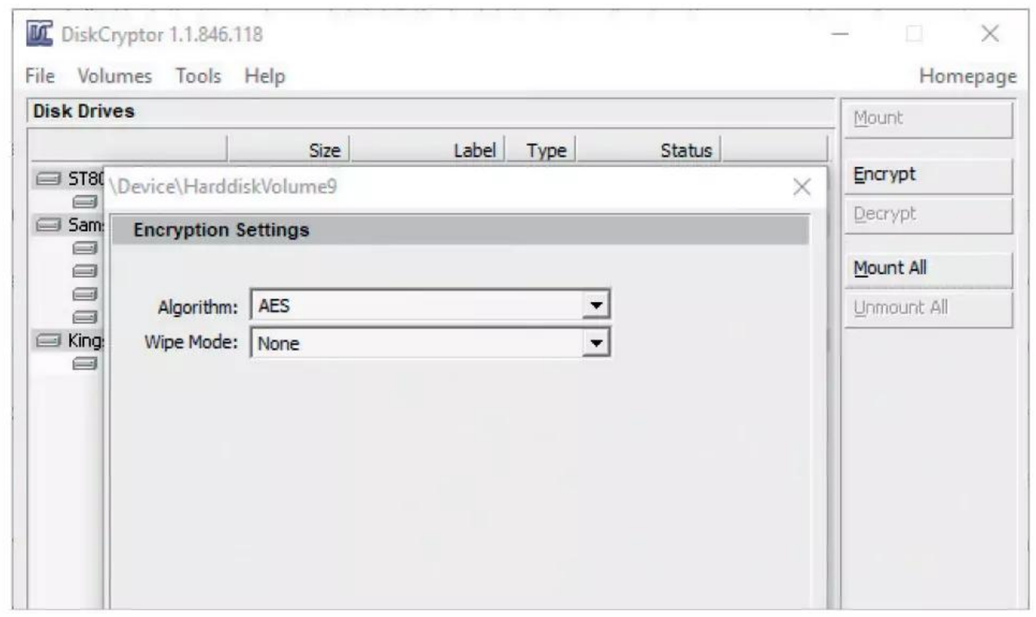
STEP 6 After a reboot, click the Windows Start button and locate the newly installed DiskCryptor program. You will need to click Yes to authorise its administrative access. With DiskCryptor open you can see the list of currently installed hard drives in your system. You can click each in turn and view its information at the bottom of the DiskCryptor window.



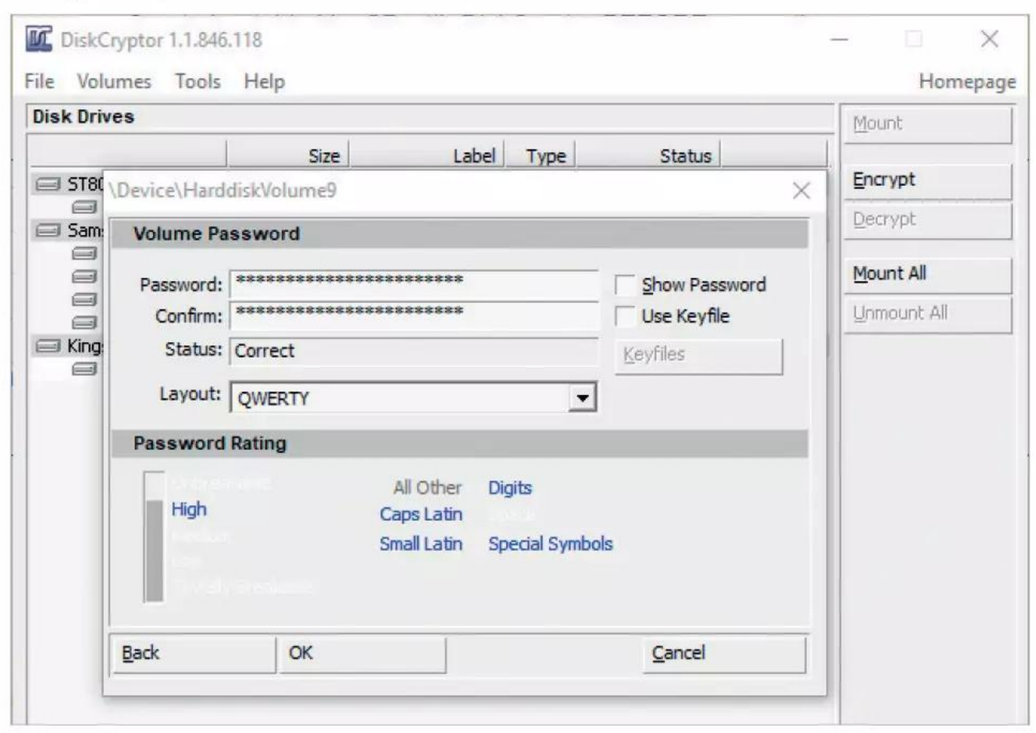
STEP 7 Start by selecting the disk you want to encrypt. In our example, as mentioned before, we're going to test this out on a USB stick. We recommend you do too, until you're comfortable with the process. With the correct drive selected, either click the Encrypt button to the right or right-click and choose Encrypt from the menu.



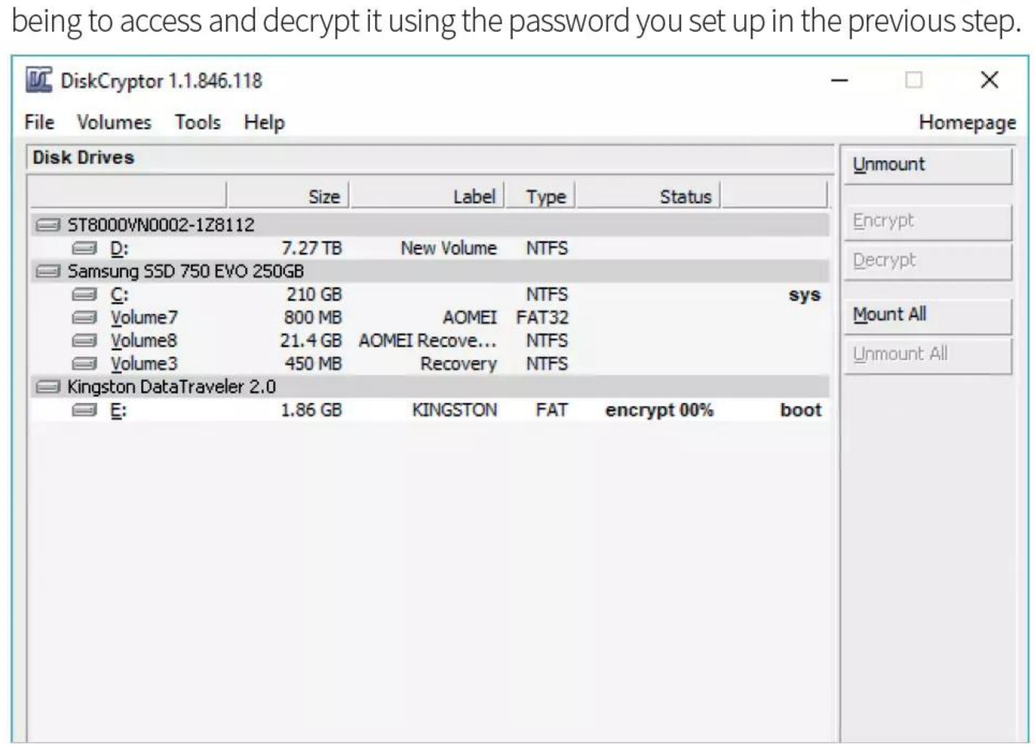
STEP 8 You're now offered a selection of available algorithms to choose from. Click the drop-down box to view them all but we recommend staying with the default AES algorithm for the time being. Leave the Wipe Mode box as None and when you're ready, click the Next button.



STEP 9 In the next section, choose a unique password for accessing the encrypted disk; you're notified how strong the password is. When you're ready, enter it again in the Confirm box. Click the OK box to start the encryption process.



STEP 10 Depending on the size of the drive, and how much data there is on it, the encryption process could take some time. When it's complete you're notified and the selected drive will the fully encrypted, with you being to access and decrypt it using the password you set up in the previous step.



Top Ten Encryption Tools for Windows

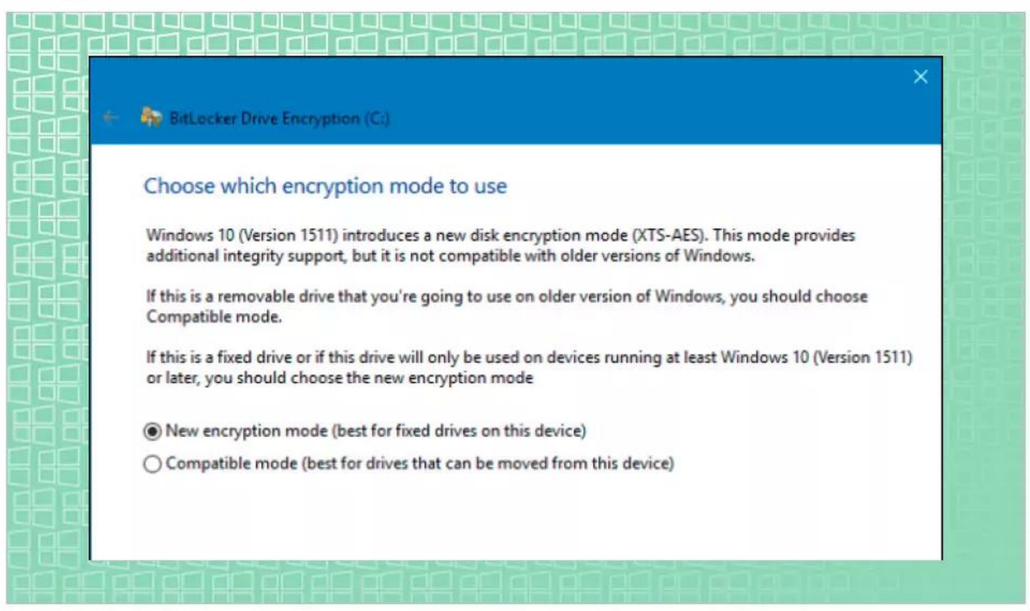
There's no shortage of programs that can encrypt files, folders and entire drives for Windows. Whilst some are very good indeed, others tend to fall by the wayside by not offering as good a solution.

Encryption Galore

Here are ten different encryption tools for you to consider that work well with Windows, and some previous versions too. Some are free, others cost but they're all good in their own right.

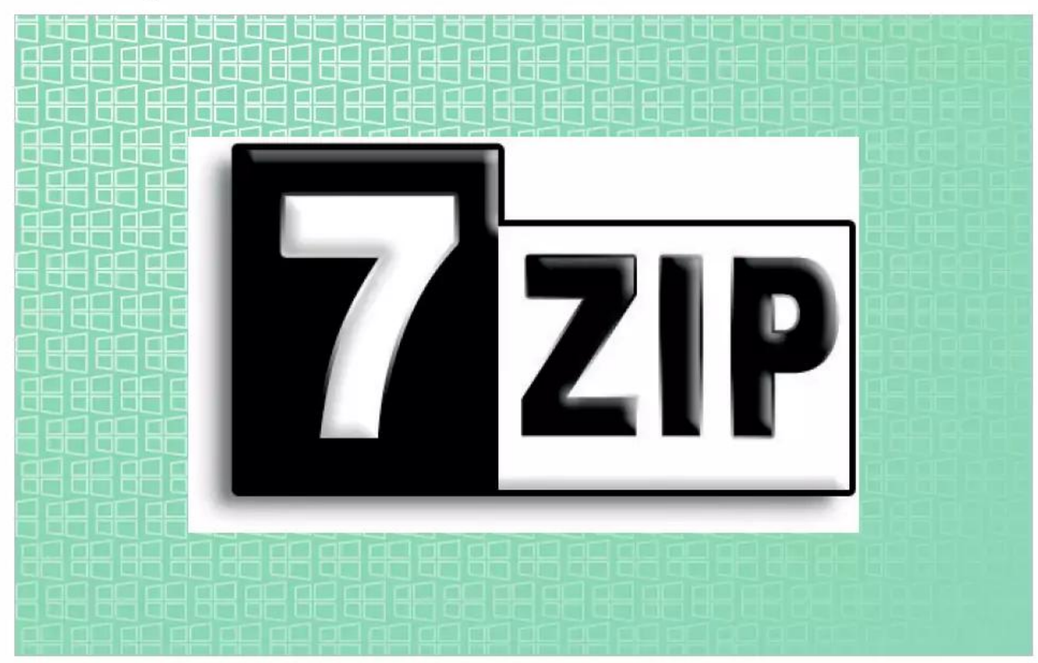
BITLOCKER

Available only for users of Windows Pro, Windows 8.1 Pro and Enterprise and Windows 7 Enterprise and Ultimate versions. If you're running the Home versions, you'll need to upgrade via the Microsoft site, or from the Windows Store. In short, BitLocker offers full disk encryption with 128-bit or 256-bit AES standards.



7-ZIP

Primarily a compression program, 7-Zip can also encrypt your data with the AES 256-bit standard. It's simple to use, completely free and comes in either 32-bit or 64-bit versions depending on which type your core Windows system is.



VERACRYPT

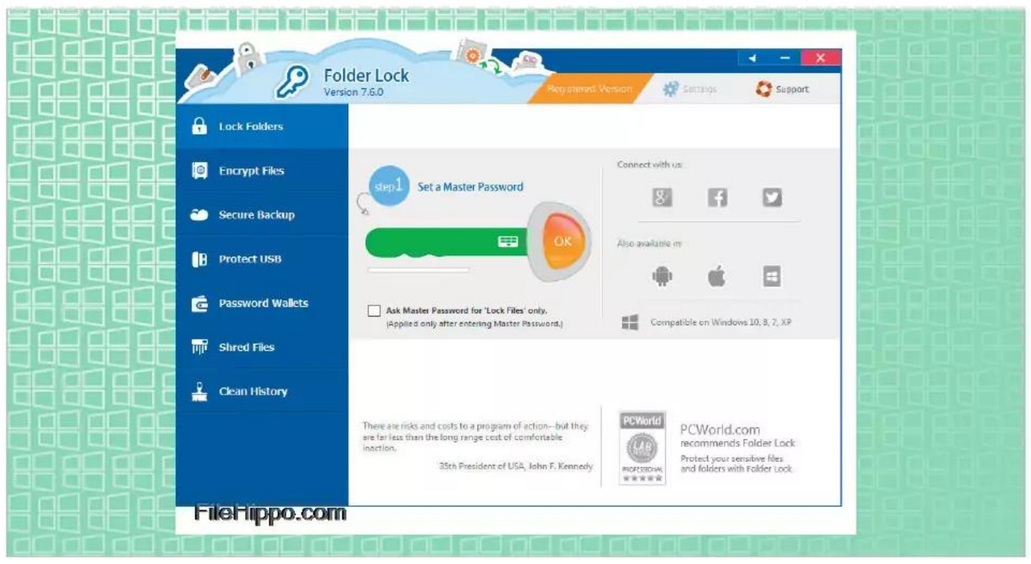
This is a free disk encryption program that's based on the popular TrueCrypt. It offers enhanced security, lots of levels of encryption and support for UEFI drives. It's available for Windows version 7 onwards as well as Mac OS X, Linux and even the Raspberry Pi.

AXCRYPT

Another excellent free program, AxCrypt offers 256-bit encryption, easy to use interface, cloud storage integration, password management, secured folders and is available in a multitude of different languages. There's support for Windows Vista onward as well as support for files sizes over 4GB.

FOLDER LOCK

An excellent and comprehensive folder locking program, with support for 256-bit encryption and Windows versions from Vista onward. It costs in the region of £40 but you'll need to check for the most recent pricing. For your money, you get secure backups, USB protection, password wallets, a secure file shredder and much more.

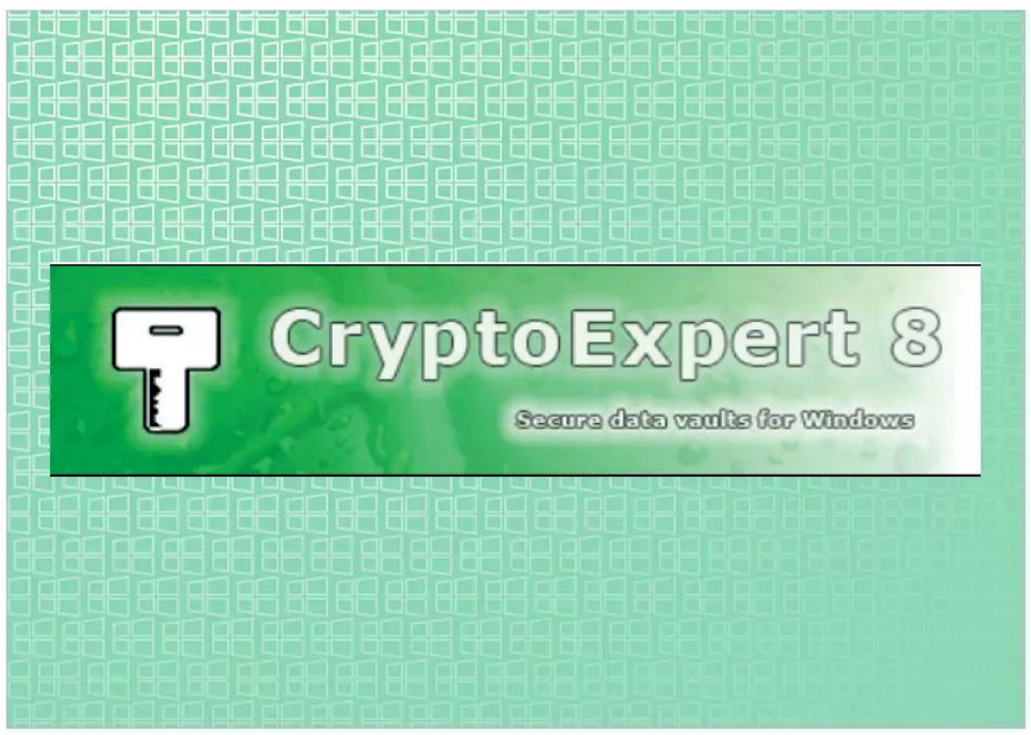


GPG4WIN

This entry is a little more advanced but once you master its intricacies it's an extraordinarily powerful program, and free. It's designed for file and email encryption, offering incredible levels of security for Windows 7 upwards and Microsoft Outlook 2003 and newer.

CRYPTOEXPERT 8

Costing around £60, CryptoExpert 8 offer support for Windows versions from 7 onward, unlimited file size encryption, 256-bit AES encryption, unlimited secure file vaults and on the fly encryption as you move and copy files around your system.

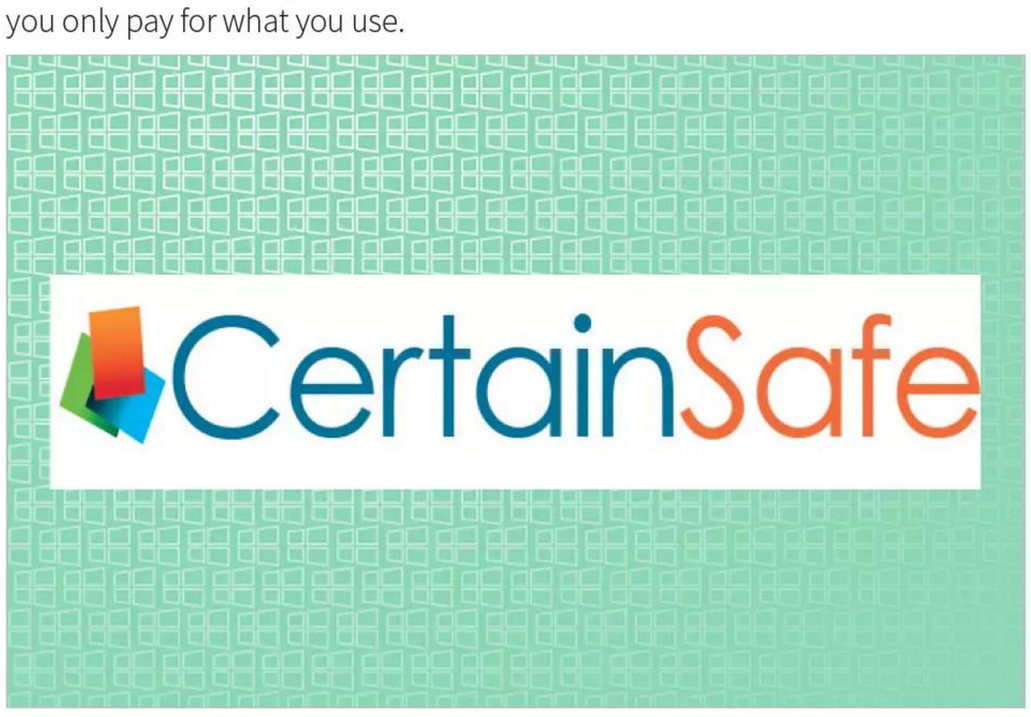


DEKART PRIVATE DISK

This is a simple and easy to use program that supports AES 256-bit encryption, compatibility with Windows Mobile, free unlimited support and updates; and it also includes its own firewall to help prevent hackers from gaining access to your system.

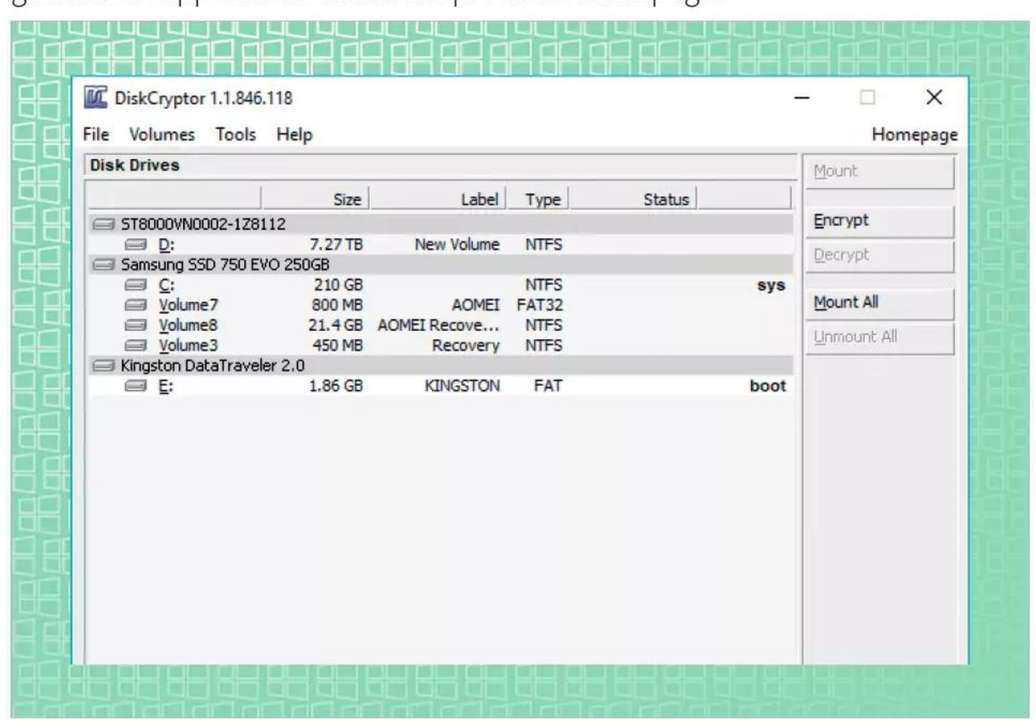
CERTAINSAFE

This is an interesting product, as it provides cloud-based encryption for any files or folders you upload into your online storage. It offers AES 256-bit encryption and an easy to use setup and integration into your cloud provider. It's Pay as you Go, so you only pay for what you use.



DISKCRYPTOR

We used DiskCryptor in the previous tutorial as it's a fairly straightforward program that can achieve high levels of encryption with ease. There's a lot more you can do with it and you can get further support from within the product's homepage.



What is a VPN?

Your system may be secure to any online threats but it doesn't always mean your privacy is assured. This is where a VPN comes in, as it offers the user a heightened level of anonymity when online and even another level of security and protection.

Virtual Private Network

Using a VPN can help hide your online presence. Whilst this may seem like an ideal way to get to illegal content, it's actually designed to help fight for your basic right to Internet and digital privacy.

Essentially, a VPN (Virtual Private Network) is a server or group of servers in a remote location that you can connect to through a client. The VPN servers then hide your Internet-bound IP address with their own, so if you connected to a VPN that's located in Australia then your IP address would be as if you were actually sat at a desktop down under.

The benefits of this are many but mainly a VPN will allow you to access region restricted websites, protect you from tracking and shield your browsing activities from those who want to find out where you are personally based. Obviously there comes a negative side, in the form of being able to access content that your country has deemed illegal for some reason but on the positive, VPNs have allowed people in countries with extraordinarily tight restrictions to get access to the outside world; often enabling them to report on what's going on in their own country to the world.

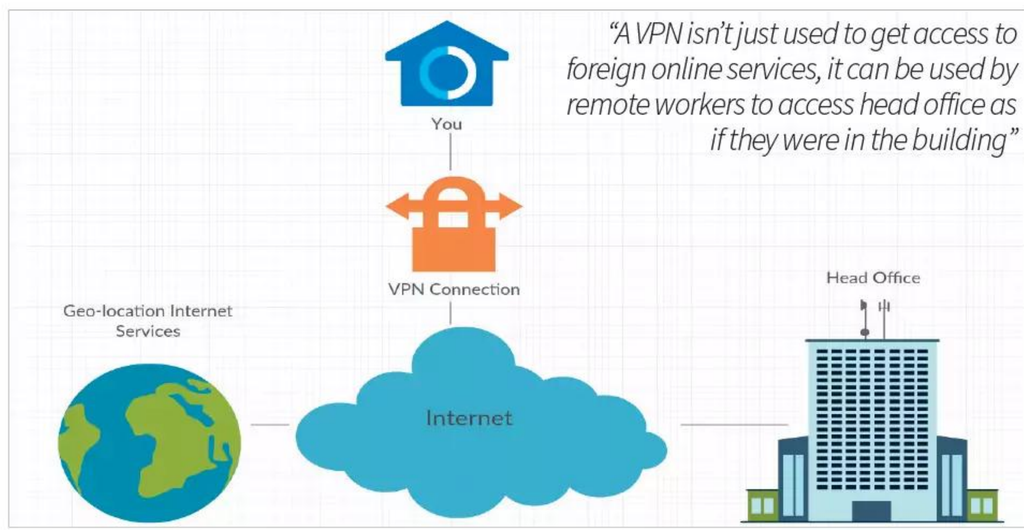
However, for most users having a VPN means they're able to gain access to TV channels in the U.S., Canada, Europe and other parts of the world. It's not always about being able to moderately 'cheat the system' by forcing the Internet to think you're somewhere else other than where you actually are though. Remote workers and employees who live in other countries can connect to company VPNs and be able to use the company's network resources as if they were physically sat in the building.

The connection from your computer to the VPN server, via the client, is usually secure to the tune of 256-bit encryption levels, depending on the VPN company who is hosting the service. All your Internet traffic will filter through the VPN server's systems, offering multiple layers of protection from viruses, malware and privacy. Beyond the other possible scenarios, using a VPN whilst you're abroad, working in a hotel for example, will enable you to access your home country's services and work resources. One more element that's worth mentioning is that using Wi-Fi hotspots is one of the biggest security risk for travellers; using a VPN can effectively improve your security whilst using a café's free Wi-Fi.

Most operating systems come with the ability to connect to a VPN through their network settings. If you have the network and connection details of the VPN in question, then you're able to connect to it using the built-in Windows, Linux or macOS options. However, the more common, and in some respects, easier method, is to use the client which most VPNs now offer as standard. The client is often simply a connection window that will ask you your login details, then provide a method of allowing you to connect to any of provider's geo-location servers, listed by country. Once the choice is made, you simply click the connect box and within a few seconds your IP address will be located within the chosen country.

There are plenty of VPN providers to choose from and we'll look at ten of the most popular in a while. Some offer a free connection service that's handy for quick browsing but isn't very fast. To gain access to faster servers, with better security and protection features you need to pay a monthly or annual subscription fee. Thankfully it's not a lot, for the most part: you'll be expected to pay in the region of £5 to £15 per month. This grants you better coverage and the ability to use up to five or more different devices, including tablets and phones.

Over the coming pages we dig a little deeper into VPNs, as you can imagine, using one will significantly improve your protection when online. In terms of Windows security, the use of a VPN is quickly becoming vital, so by the end of this chapter you'll be knowledgeable and helpfully utilising one to your own advantage.



> *Using a VPN will protect your access online and filter all your Internet traffic through its secure service.*

"You're able to access web pages and Internet services from all over the world, even if you can't from your own country."

"A VPN greatly improves security for devices and when you're using free Wi-Fi at cafés and other such locations."

How Can a VPN Improve Online Security?

We've emphasised the enhanced privacy that a VPN offers when you're connected to its services, and the heightened levels of anonymity, but what security benefits does a VPN bring to a Windows computer with an antivirus program already installed?

Security Beyond Anonymity

It's a good question: how can a VPN improve Windows security? Whilst the privacy side is well catered for, there are some good security enhancements and features a VPN brings to the table.

BROWSING ACTIVITY

This doesn't happen often but an ISP can become compromised and details of user activities leaked or stolen. Using a VPN can hide your browsing activity from trackers and even your ISP, enabling you to browse with freedom of fear of having your details leaked or accessed by others.

ANTIMALWARE

Many VPN providers utilise a level of antimalware into their security layers. This enhances your security by filtering any downloads through the VPN first. Should there be a virus present, then it can be removed or stopped at the VPN before it even reaches you.

THREAT PROTECTION

To expand the previous feature, VPNs will filter web pages that are dangerous or contain threats. Even with a good antivirus client installed, you can still access a dangerous site. Using a VPN will stop the site from even being loaded.

HIGHEST ENCRYPTION

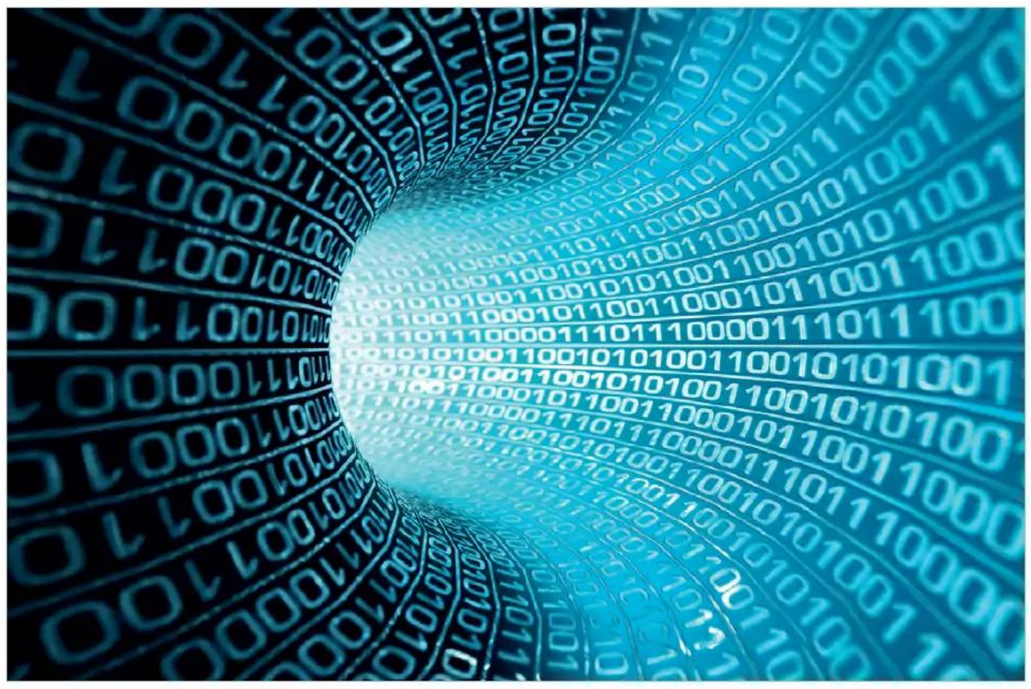
The connection between you and the VPN server is encrypted to the highest possible standards. This makes it near impossible for some external element to gain access to the data you're transmitting. Online banking and shopping are extremely secure with a VPN.

WI-FI PROTECTION

Public and free Wi-Fi hotspots are notorious when it comes to mobile security. Anyone with a little knowledge and some free tools via the Internet can intercept public Wi-Fi network and hijack your connection, revealing all your data. A VPN will encrypt the data and protect you.

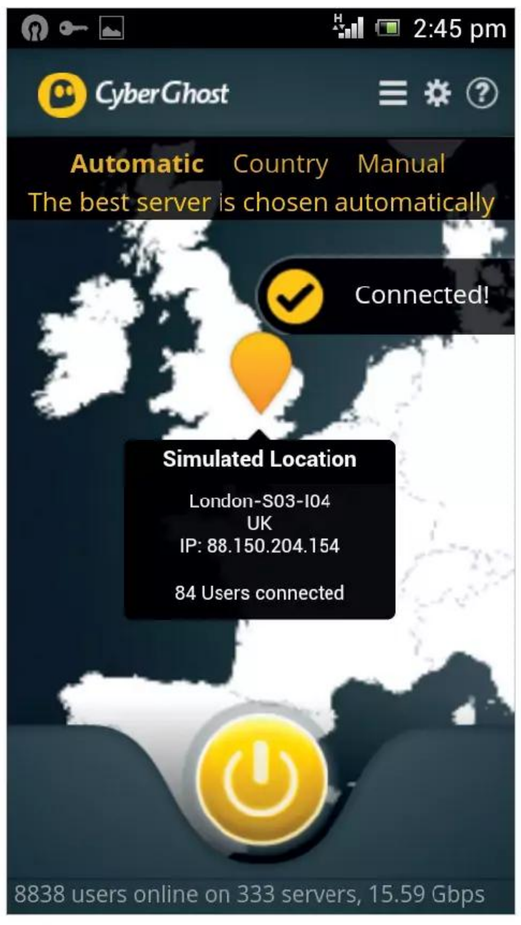
SECURE TUNNEL

If you're working abroad, or you're a remote worker, then a VPN connection to the company's servers will ensure that all the sensitive business data will remain secure. It's difficult for a company to ensure 100 per cent security with mobile and off-site workers but a VPN will provide a secure tunnel straight to the company itself.



MULTI-PLATFORM

The availability of iOS and Android VPN clients means that your call data and data stored on your device is also secure. Mobile VPN apps will use the same levels of protection and security, so your data can't be stolen when you're not even aware of it.



AD BLOCKING

Most VPNs will also add an extra layer of security whereby they actively block any advertising from websites. Internet ads are a necessary evil in some ways, as they provide much needed funds for your favourite freely available websites. However, some contain malicious content and need to be blocked.

USE HTTPS

Using HTTPS instead of HTTP uses the secure side of the Internet protocol. Sadly, it's not always implemented in browsers or by users. Many VPNs will force all websites to use the secure connection that a HTTPS site offers, enhancing your browsing security.

ZERO LOGS

In some countries data retention laws are quite archaic, with governments and other bodies being able to access your data log for as long as you've been able to access the Internet. A good VPN won't detail any logs of your browsing and in most cases won't even hand over any personal information relating to you to other agencies.

Top Ten VPNs

There's no shortage of programs that can encrypt files, folders and entire drives for Windows. Whilst some are very good indeed, others tend to fall by the wayside by not offering as good a solution.

Encryption Galore

Here are ten different encryption tools for you to consider that work well with Windows, and some previous versions too. Some are free, others cost but they're all good in their own right.

CYBERGHOST CyberGhost is our favourite VPN. It offers 256-bit AES military grade encryption, no logging, access to 27 countries and hundreds of servers, protected browsing, ad blocking, access to fast servers, unlimited traffic and bandwidth and an anti-fingerprint system. All for around £5.83 per month for up to five devices.

NORDVPN NordVPN offers two levels of encryption, access to fast servers, no logging, a kill switch in case the VPN connection drops and you're still surfing and support for multiple devices and operating systems. It's well priced and is highly regarded among the press and media. Not bad for a mere $5.75 per month (around £4.50).

HMA Despite its colourful name, Hide My Ass VPN is considered to be one of the best services available. Along with the usual secure 256-bit encryption connection you get blistering speeds, access to over 300 locations, anonymous email use, a free web proxy access and free extensions for your browser. Expect to pay around £5 per month.

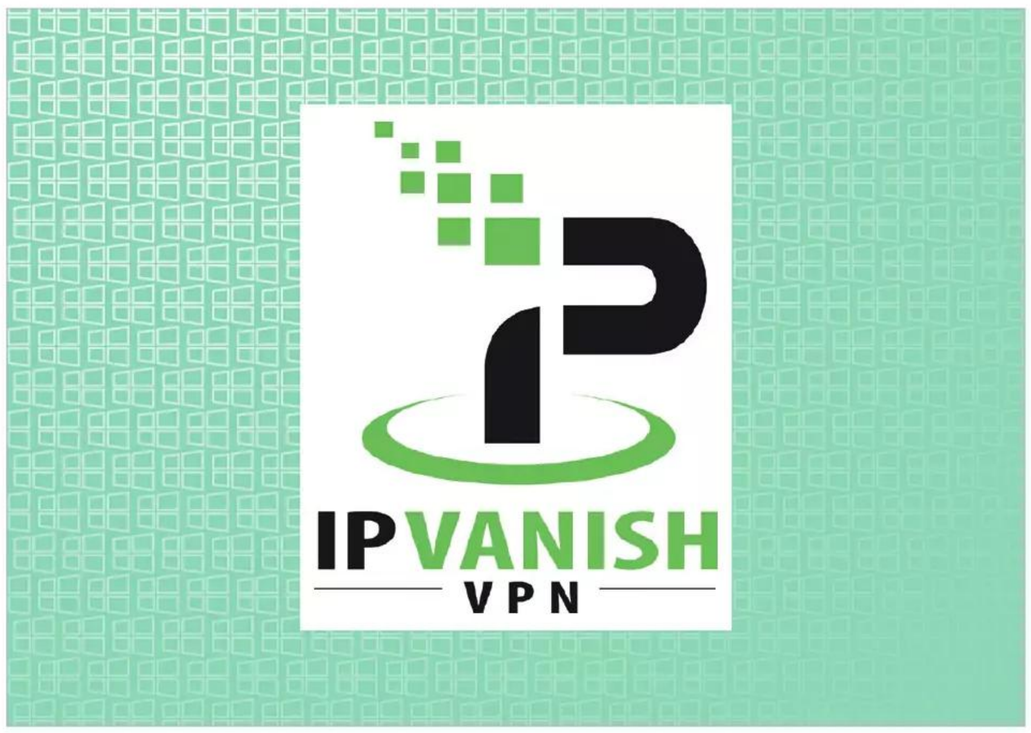
PUREVPN With support for multiple devices, 256-bit AES encryption and access to 180 locations worldwide with 750 plus servers, PureVPN is a great choice for the home user. The cost varies depending on the package but expect to pay in the region of $5.90 (around £4.58). Just as with all these VPNs, it's worth checking for the latest pricing.

VPN UNLIMITED

VPN Unlimited offers a full firewall service with anti-malware, ad blocking and anti-tracking. There's 256-bit AES encryption, over a thousand servers in 70-plus locations, support for up to five devices, fast servers and app support for iOS, Android and Widows Phone. Pricing varies but expect to pay around $8.99 (approx. £6.97) per month.

IPVANISH

IPVanish is another highly regarded and awarded VPN service. For $6.49 (around £5) per month depending on the package, you get access to fast servers, unlimited bandwidth, no logging, 256-bit AES encryption and support for up to five different devices.



TUNNELBEAR VPN

TunnelBear VPN offers an initial 500MB per month free service, moving up to $9.99 (around £7.75) per month for unlimited bandwidth. For this you get access to fast servers across twenty plus countries, 256-bit AES encryption and support for Windows, iOS, Android, macOS and browser add-ons.

PRIVATE INTERNET ACCESS

Private Internet Access VPN offers a wealth of features with its impressive service. 256-bit levels of encryption, no traffic logging, ad blocking, support for five devices and access to over three thousand servers across twenty five countries. It's surprisingly cheap too, at just $6.95 (about £5.40) per month depending on the package you opt for.

VYPRVPN

VyprVPN is an exceptionally good service that offer access to fast servers, multiple device support, unlimited bandwidth and connection, 256-bit AES encryption and access to over seventy global locations and hundreds of servers. The Premium package costs just £5.83 per month for a one year subscription, but check regularly for any changes.

FACELESS.ME

Faceless Me is an interestingly named VPN service. Amongst its features expect to see elevated levels of encryption, unrestricted access, an easy to use interface and unlimited traffic. You get 2GB per month for free but for $6.65 (around £5.16) you can have unlimited access and traffic.

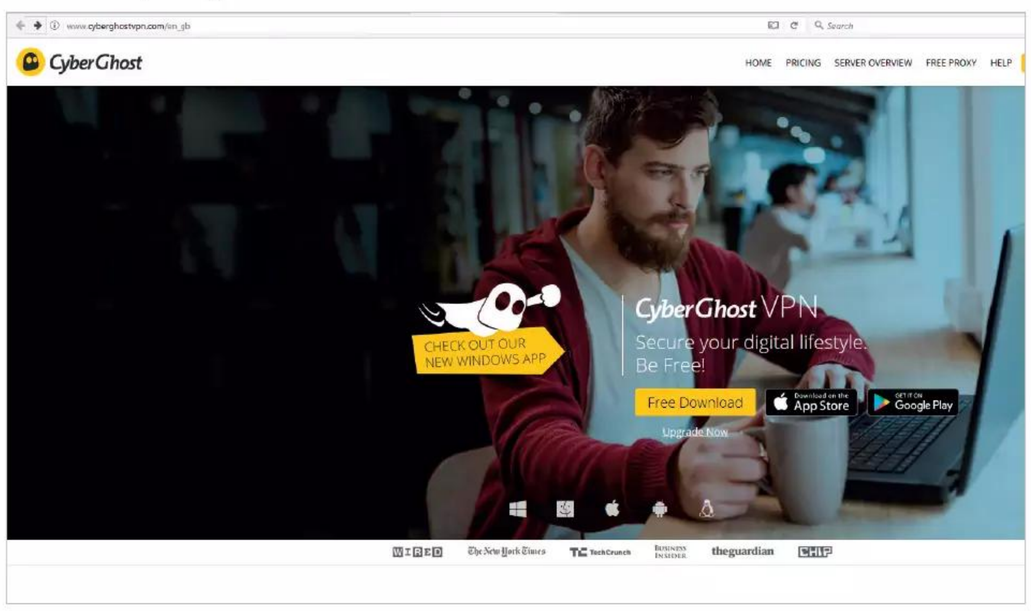
Using a VPN for Added Security and Privacy

We've covered how a VPN works, how it can improve your security and given you a top ten chart of recommended providers but we've not looked at how you would set one up and what it's like when up and running.

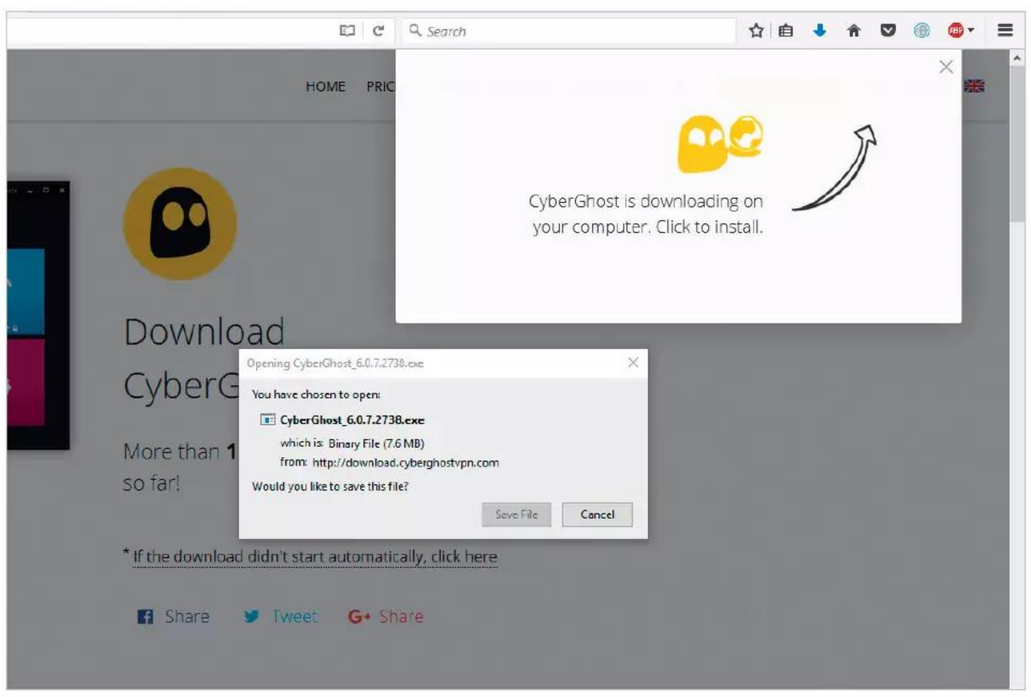
CyberGhost

We're going to use CyberGhost as the example VPN for this tutorial. You'll need to purchase one of the available packages to begin with, Premium is £3.74 per month, while Premium Plus is £5.83.

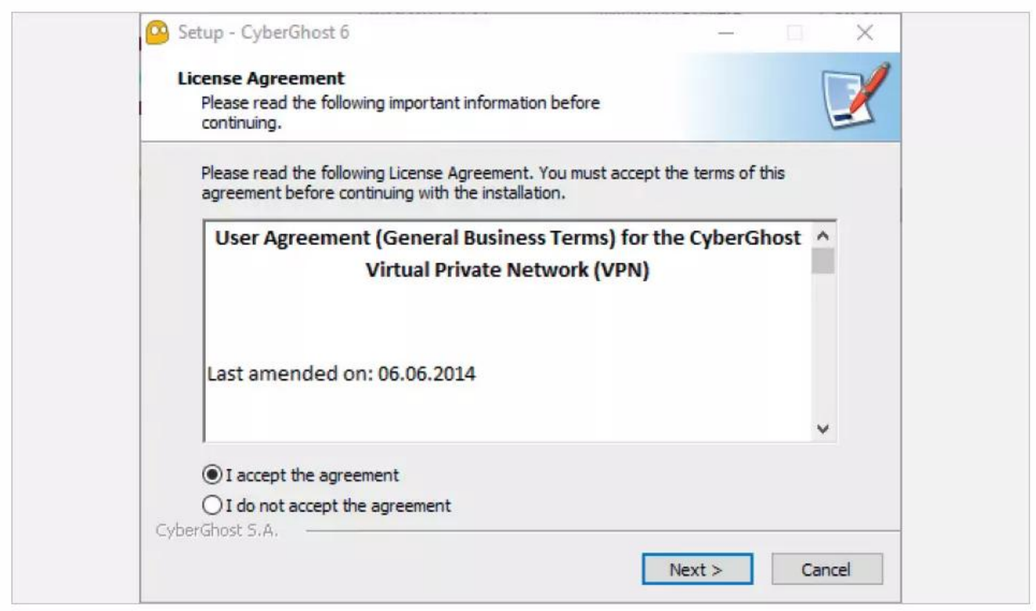
STEP 1 We won't use the free option in this instance, as the paid for services offer a better set of features with which to display the VPN in action. Start by navigating to www.cyberghostvpn.com and clicking on the Pricing link in the upper portion of the main CyberGhost site for your regional and latest pricing.



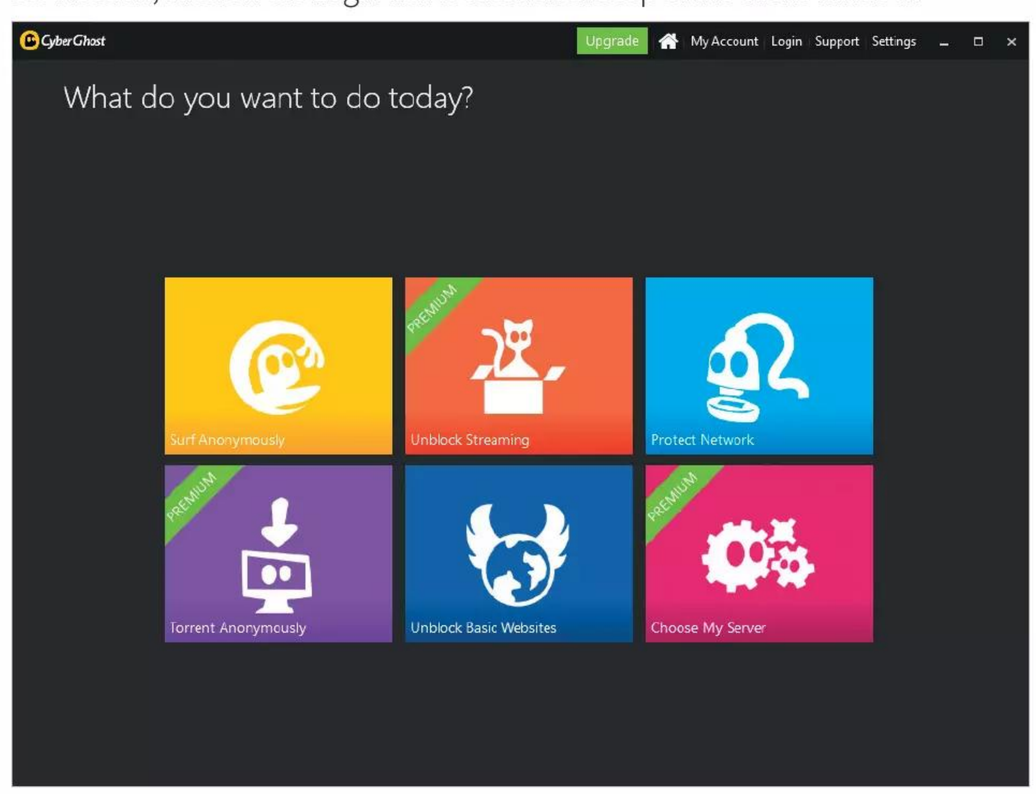
STEP 2 Assuming you've purchased one of the options, click the yellow Free Download button located in the top right of the main page. This will, after a few seconds, automatically initialise the download of the latest CyberGhost client software. Click Save File to download it to your Downloads folder.



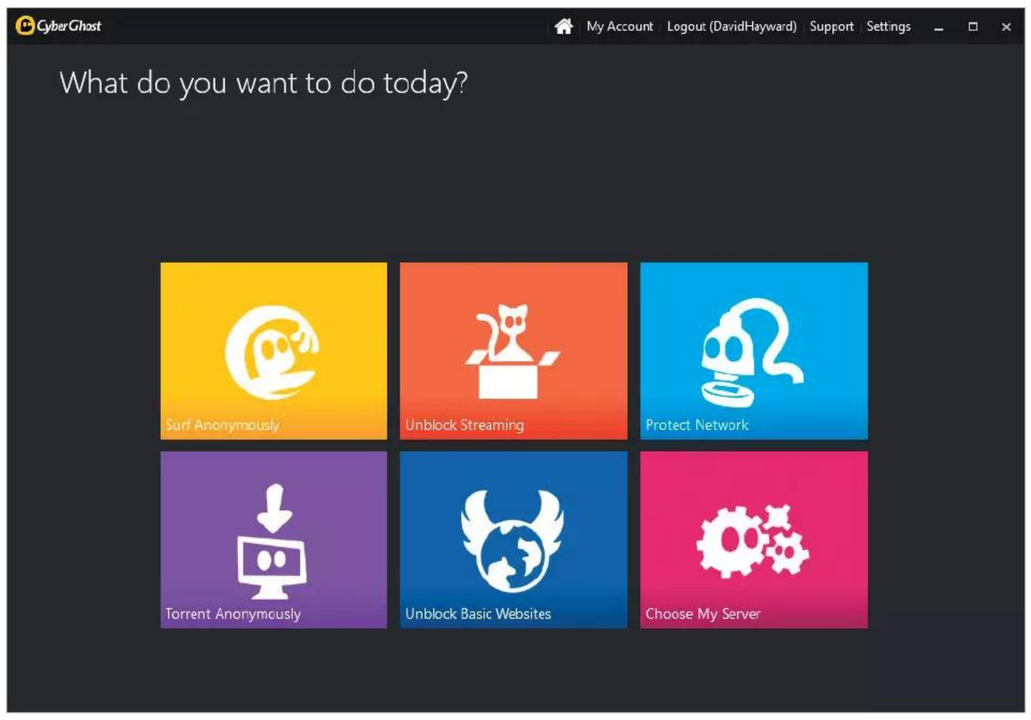
STEP 3 Go to the Downloads folder and double click the CyberGhost executable followed by a click on Yes for the Windows authentication process. Accept the agreement and follow the on-screen instructions to set up CyberGhost on your PC; the default options are fine to use, unless you specifically require a different location for installation.



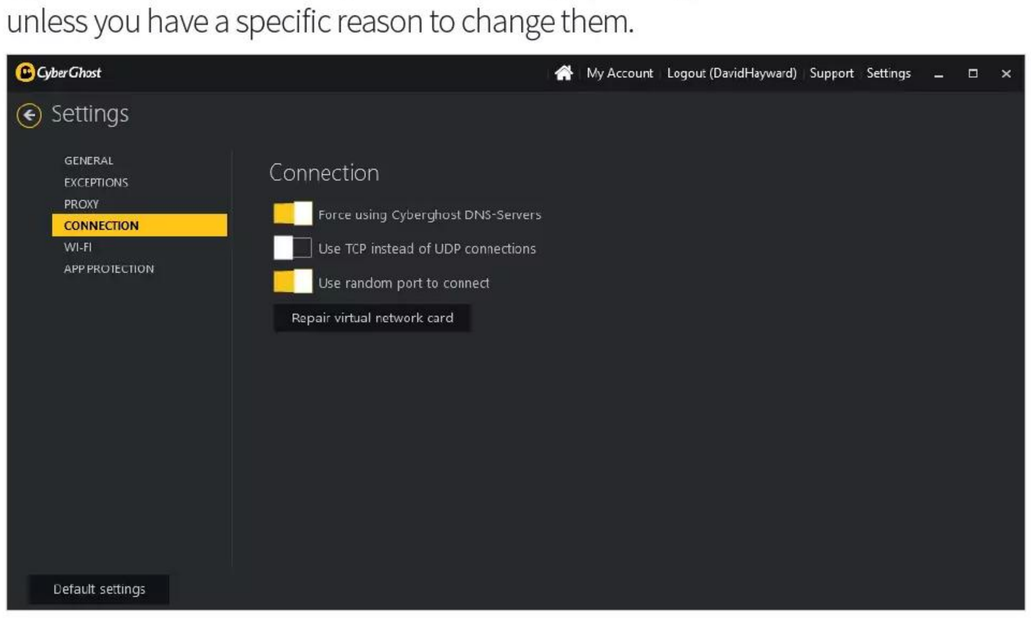
STEP 4 Once the installation is complete you're presented with the main CyberGhost client window. However, before you make a connection, click on the Login link located at the top of the client window.



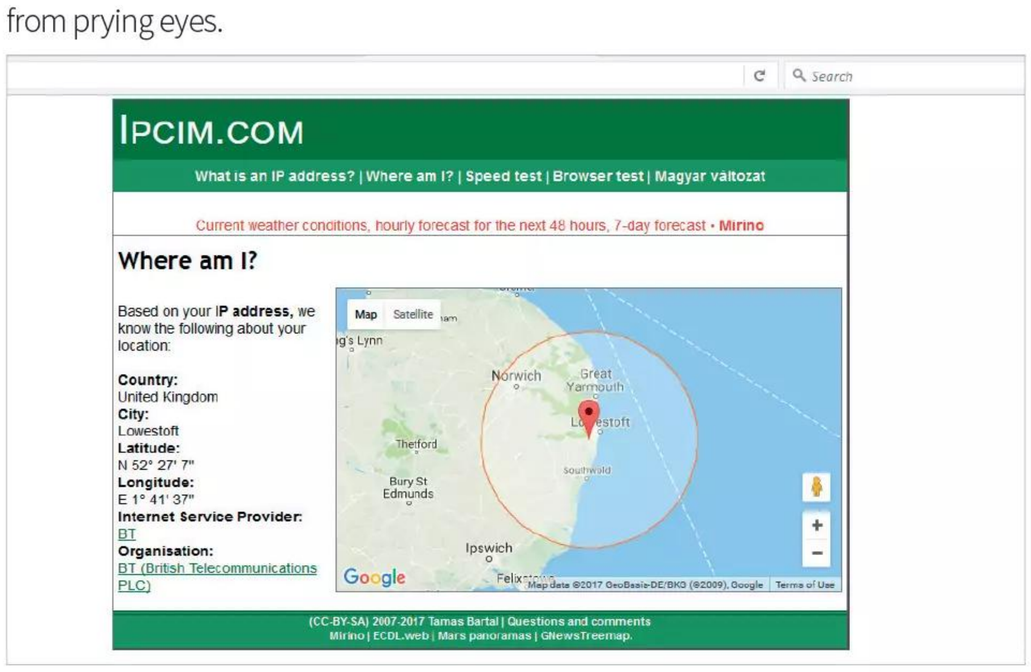
STEP 5 Enter your CyberGhost login and password that you set up when you purchased the package and click the OK button. Once the login is confirmed you're taken back to the main client window where the available options for the account package you purchased will be displayed.



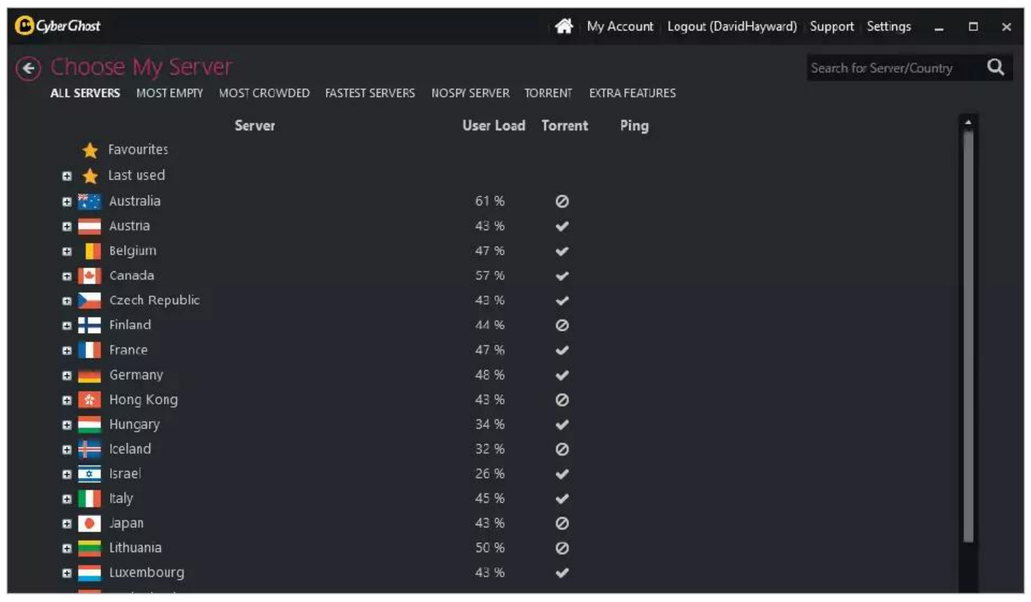
STEP 6 Before you use the service, it's best to check a couple of things. First click on the Settings link along the top of the client window. In here you can see multiple options for the control, connection and how CyberGhost will work with your PC. Generally speaking, the defaults are fine unless you have a specific reason to change them.



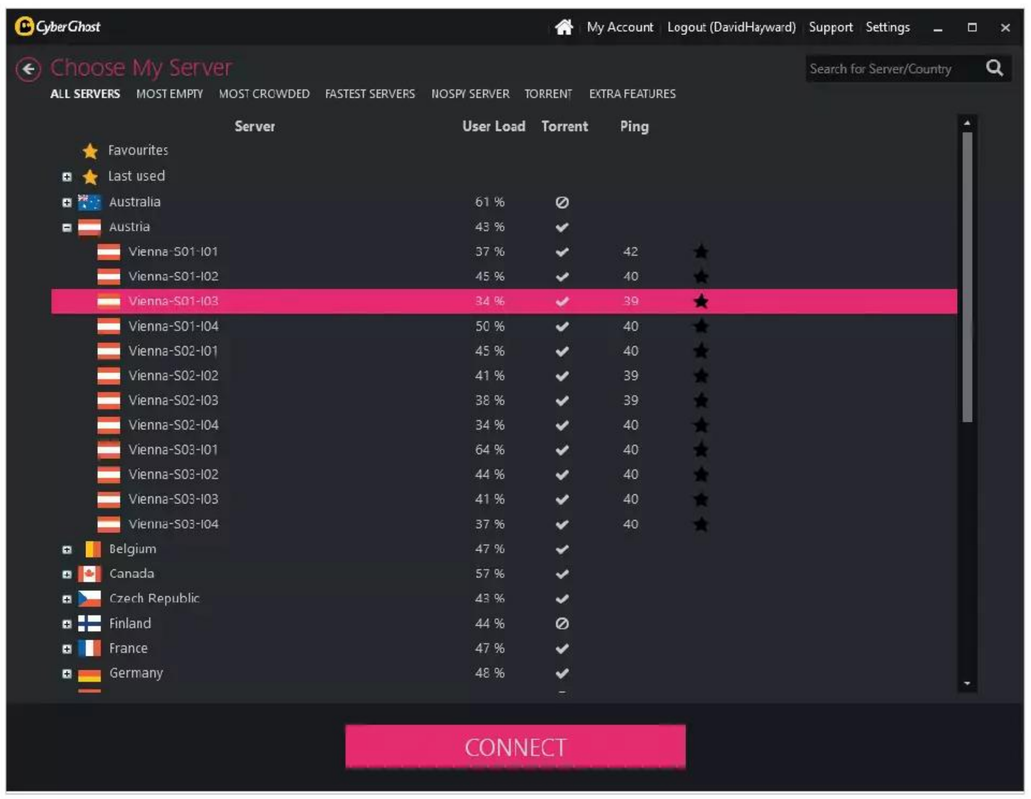
STEP 7 One more thing before connecting to the CyberGhost VPN: open a browser and enter www.ipcim.com/en/?p=where. This will display detailed information based on your IP address, such as the ISP you're using, the country, city, even latitude and longitude, complete with a map and possible radius you fall into. This is the kind of information we want to secure from prying eyes.



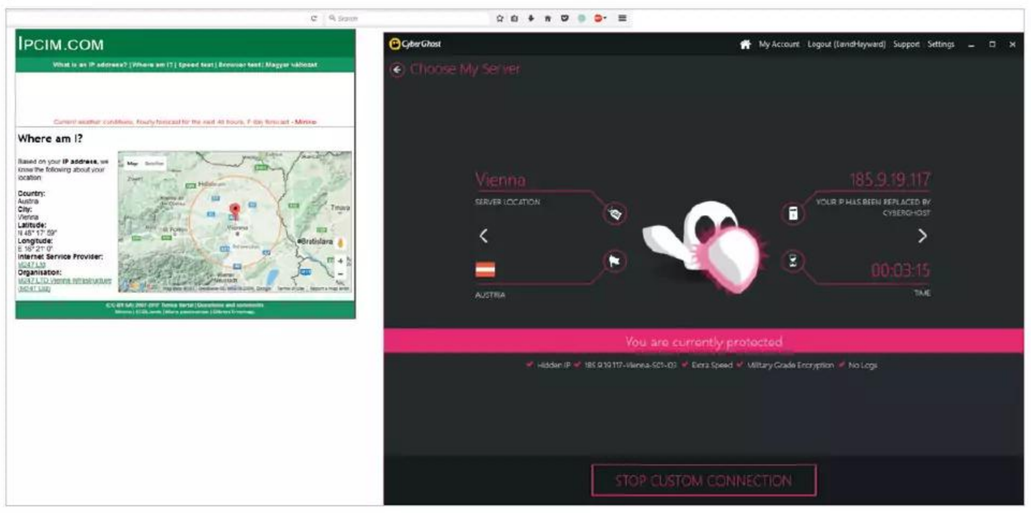
STEP 8 Click back to the CyberGhost client and return to the main window. Click the Home icon along the top of the client window and then the Choose My Server button in the bottom right. This allows you to choose your own server from the available countries that CyberGhost works with.



STEP 9 Look through the list and pick a server; we're going to use one of the Vienna servers in this instance. The Ping value is how fast the server is, the lower the ping the faster the connection. Either click to highlight the server followed by clicking the Connect button or double-click to launch the server connection.



STEP 10 The CyberGhost client will take a few seconds to connect. When it's ready you'll see a 'You are currently protected' message in the client. Close your browser and relaunch it, then return to the www.ipcim.com/en/?p=where page. You can see that the Internet now thinks you're located where the chosen CyberGhost server is, protecting and securing your privacy and personal details.



Online Protection and Recovery

While you can successfully protect yourself and your own computer, as soon as you make a connection to the outside world you're under the influence of many external factors. We look at how data is transmitted from your computer to the Internet and how a canny hacker can intercept that data for their own means.

Over the coming pages you'll discover how best to protect yourself and what strategies you can use to become more secure when online; even when you're out and about with your Windows laptop and other devices.

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How Does Information Move Around the Internet?

Before we get into online protection and disaster recovery, it's worth taking a moment to look at how information moves around the Internet, in particular your information. Just how is data sent from your PC across the Internet, to potentially fall into the hands of someone else?

Information Superhighway

The Internet is a huge, complex network of computers and is widely credited as humanity's greatest achievement. It's estimated that the Internet houses something in the region of 10^{24} bytes of information, which is quite a lot.

That estimated 10^{24} bytes equates to an exabyte of potential information held by every single connected device that makes up the Internet, some of which is your information. It's an impossible number to visualise, since we're only using gigabytes or terabytes of storage in most of our devices. More to the point though, how on earth does all that connect together, and how does it work?

To be able to transmit all that information, the data that travels around the Internet is in packets. Each of these packets contains a header and a footer. The information stored in the header and footer contains the details regarding the data being sent. For example, if you send an email to someone, as soon as you click the send button the data will be wrapped up in headers and footers, split into numerous packets and sent on its merry way.

Whilst that sounds logical, much in the same way a telephone call takes place, the reality is quite different. Those packets can take any route possible to get to the destination, as defined by the header and footer. Those routes don't necessarily all have to be the same either. Some packets may travel from one server to the next via one data pathway, while others will take another. The server at the other end will use the information provided by the headers and footers to collate the message, reform the data and present it to the email recipient the way in which you intended it to.

Remarkably, if the server at the other end detects missing packets it can request the missing information from its available connections. Any missing data can then be sent via an alternative route, updating the information as it goes so other packets will know that the previous route isn't getting through. The headers and footers then tell the server that the data packets are all present and what they should look like; the email will arrive accordingly.

All this happens in milliseconds. This sounds incredibly complex and on paper it makes the Internet appear to be a slow, lumbering beast dealing with incomplete packets of data. In a way that's how it works but instead of being a lumbering beast, the Internet or more accurately, the servers and computers attached to it, are fathoming data packets by the millions every second.

Just as we've seen, each computer on the Internet is connected using an IP address. These are registered across the Internet, so the headers and footers in each packet contain the IP address of the sender and where the data is heading to. That way, it's not just a random collection of data travelling across the ether in the hope of landing in the right place. The DNS, Domain Name System, converts the IP addresses to readable names, such as Google.com and the like, and back again. That way when you enter the email address someone@somewhere.com the DNS servers will convert the information and the packets sent to the relevant destination.

The protocols used throughout the Internet define what the data being communicated actually is. For example IMAP, Internet Message Access Protocol, is a mail protocol for accessing email on a remote server, such as accessing Gmail. These protocols help further the transmission of data to its intended location, making it more accurate and telling the computer on the other end what it is and how to piece together the jigsaw puzzle of packets that will be received.

Essentially this is how information is sent and received around the Internet. Obviously, there's a lot more going on in the background than we've mentioned here. The complexity that you can go into when dealing with data transfers is quite staggering and a little bewildering at times. Suffice to say, all those packets of data contain information about something or someone and somewhere out there are packets of data that contain information about you, where you are, what you're doing, and other personal details such as bank accounts, passwords, names and addresses.

> *The Internet is regarded as the greatest human achievement, and it's not difficult to see why*

"Data is split into packets, with headers and footers telling servers what to do with it and where its going. "

"Along with protocols, packet information can take any possible route to its destination and it happens in a matter of milliseconds."

```
Tracing route to www.bdmpublications.com [2a03:b0c0:1:a1::18a:f001]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms  broadband.bt.com [2a00:23c4:7591:7200:ae84:c9ff:feb6:f097]
  2     *        *        *     Request timed out.
  3     *        *       11 ms  2a00:2302::1100:100:36
  4    16 ms     8 ms     8 ms  2a00:2302::1100:100:37
  5    10 ms     9 ms     9 ms  2a00:2380:300c:b000::e
  6     8 ms     8 ms     8 ms  2a00:2000:2066::4a
  7     9 ms     9 ms     9 ms  ae-6.r04.londen05.uk.bb.gin.ntt.net [2001:728:0:5000::6b5]
  8     8 ms     8 ms     8 ms  ae-0.r24.londen12.uk.bb.gin.ntt.net [2001:728:0:2000::5d]
  9     9 ms     9 ms     9 ms  ae-1.r25.londen12.uk.bb.gin.ntt.net [2001:728:0:2000::152]
 10    11 ms    12 ms    11 ms  ae-2.r02.londen01.uk.bb.gin.ntt.net [2001:418:0:2000::104]
 11    10 ms    11 ms    10 ms  2001:728:0:5000::af6
 12     *        *        *     Request timed out.
 13    11 ms    10 ms    10 ms  2a03:b0c0:1:a1::18a:f001

Trace complete.
```

"DNS servers translate IP addresses to readable locations, the packets then know where exactly to head to deliver the data."

How Can Internet Data be Intercepted?

We've seen how data travels around the Internet in packets and with the help of various protocols that determine its source, destination and what manner of data packet it is. While that's all well and good, it's worth knowing how a hacker goes about intercepting that information.

The data packets that make up a message, or a string containing a username and password, are sent to and from yours and other computers without most of us ever really knowing what's going on in the background. It's this lack of knowledge that's the hacker's greatest tool. Well, that and some clever software that's freely downloadable from the Internet. Let's look at how data can be intercepted by a hacker. Let's use the scenario that you're on a business trip, or just out and about, and you're using a café's free, public Wi-Fi.

There are numerous, and quite ingenious, ways in which data can be intercepted by a hacker.

> *"Man in the Middle"*

Normally you need to be using an unsecure network, such as a public Wi-Fi but there are other ways and means.

MITM

The first and most notable form of attack is called MITM or Man In The Middle. This attack utilises a set of free tools that can essentially grab data packets from the locally used network. This means that the data packets leaving your computer must travel through the free Wi-Fi's network before going off into the Internet to its destination. The MITM attacker can sniff out this data, intercept the stuff that looks interesting, which can be done by reading the headers and footers and determining what the message/information contains, and decode it to view in plain text on their computer.

Think of this form of attack as a postman opening a bank statement letter, writing down all your bank details, then sealing the envelope before posting it through your door. The data packets are easily intercepted on the free Wi-Fi and unless you're using a HTTPS site, they take very little effort to decode and read.

Shoulder Surfing

Whilst not a technical way of intercepting data, hackers will still use the old tried and tested method of stealing information simply by sitting close to you and peering over your shoulder whilst you enter login details or write an email.

It doesn't take much skill, as we're usually so busy concentrating on other things that we often fail to notice someone looking over our shoulder. However, it's a real and credible threat, so be wary.

Fake Wi-Fi

This is another element to a MITM attack, also known as an Evil Twin. Essentially a hacker can sit at the same café as you and everyone else and use a set of tools that can pretend to be the actual Wi-Fi router belonging to the café. This enables them to do several things: first, they're able to beam out the fake Wi-Fi signal to every device within range, which in turn (if the users have their devices set to attach to any freely available Wi-Fi) will instantly connect to the fake signal. Secondly, once they have a device connected, they're able to use their laptop and the tools therein to intercept all the traffic that's being sent to their fake Wi-Fi signal. Thirdly, the attacker can connect themselves to the actual café Wi-Fi and act as a filter to the real connection to the Internet. The victim isn't even aware that their connection is compromised.

Naturally, this means that every single scrap of data is being filtered through the hacker's system. It's just up to them to collect it all, decode it and use the information within for their own gains.

Fake Sites

We've mentioned fake websites previously. This way of data interception is often working hand-in-hand with the scenario we're using as an example. Combining the aforementioned Evil Twin and packet sniffing methods, a hacker, who has taken the time to set up the scam, can create several fake website front ends that mimic banking sites, Outlook access, login pages and so on. They then host those sites on their interception laptop, together with the Evil Twin fake Wi-Fi and should a user connect and request the page of their bank they instead get the fake site that the hacker set up.

The victim will then unwittingly enter their details, which will be stored by the hacker before forwarding the victim to the actual bank website. The victim will then be required to re-enter their banking details into the actual bank website. For their part, they simply think they're mistyped a password and gain access to their account as normal. Sadly, the hacker now has plain text information regarding all their login details and can begin to transfer money from their account.

10 Tips to Protect Yourself Against Interception

While it may seem like fearmongering, detailing the ways in which data can be intercepted, it's sadly a real world fact. Public Wi-Fi, hotspots and free access points are the bane of the security industry. Thankfully, there are ways in which you can protect yourself.

Public Safety

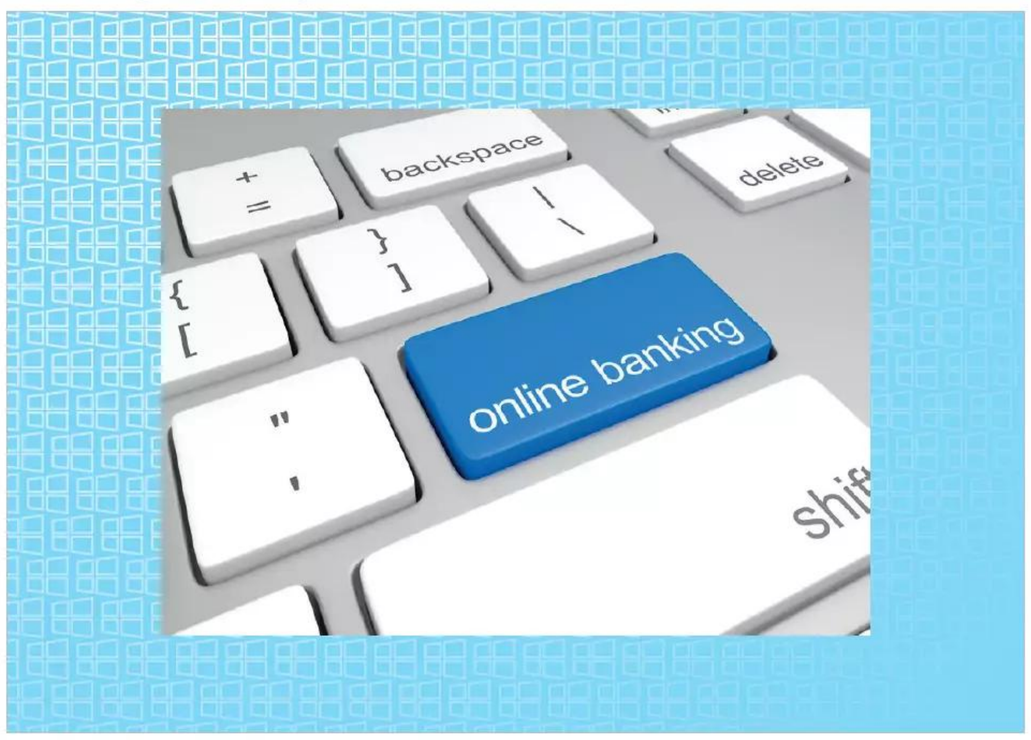
Despite the different and varied ways a hacker can gain access to your inbound and outbound data, there are means in which you can defend yourself. Here are ten tips to help you protect your data from being intercepted.

TIP 1 Not all public Wi-Fi access points are havens for nefarious hackers but that doesn't mean you should let your guard down. Every security software and firewall in the world can't help you if you're not savvy when it comes to information security. If you're going to use public Wi-Fi, don't use it for banking or other highly personal detail transactions.

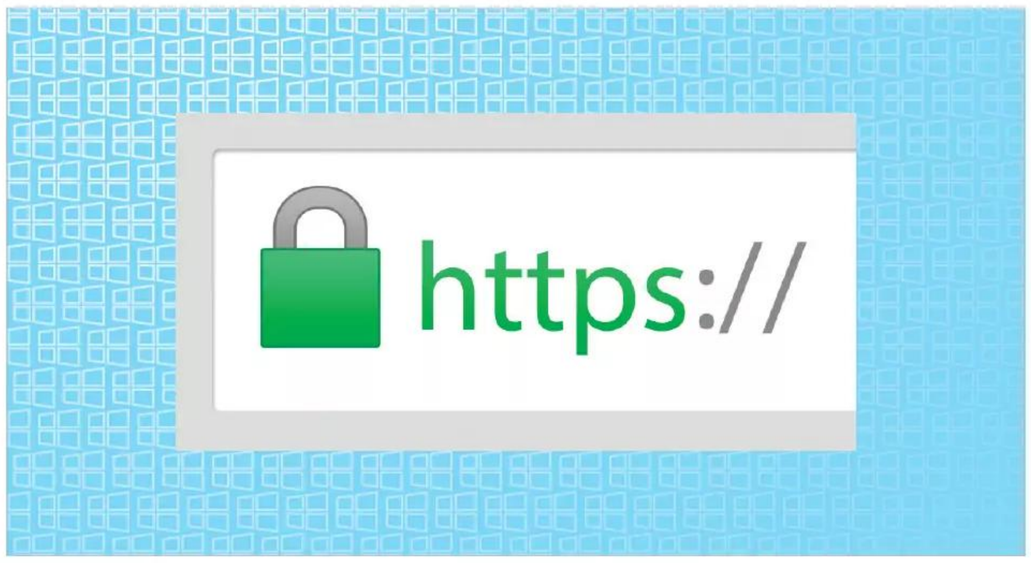
TIP 2 It may not always be possible to spot an Evil Twin fake Wi-Fi access point. It's often best to double-check with members of staff, if it's a café, airport, restaurant or similar, that the Wi-Fi you're connecting to is actually theirs and not one that's being spoofed. Avoid Wi-Fi names like 'Free Wi-Fi Here' or similar.

TIP 3 Always double-check a website for spelling errors, older logos or anything else that may raise an alarm. If your banking website looks even remotely different from when you last used it, try and avoid logging into it until you get to a more secure Internet location.

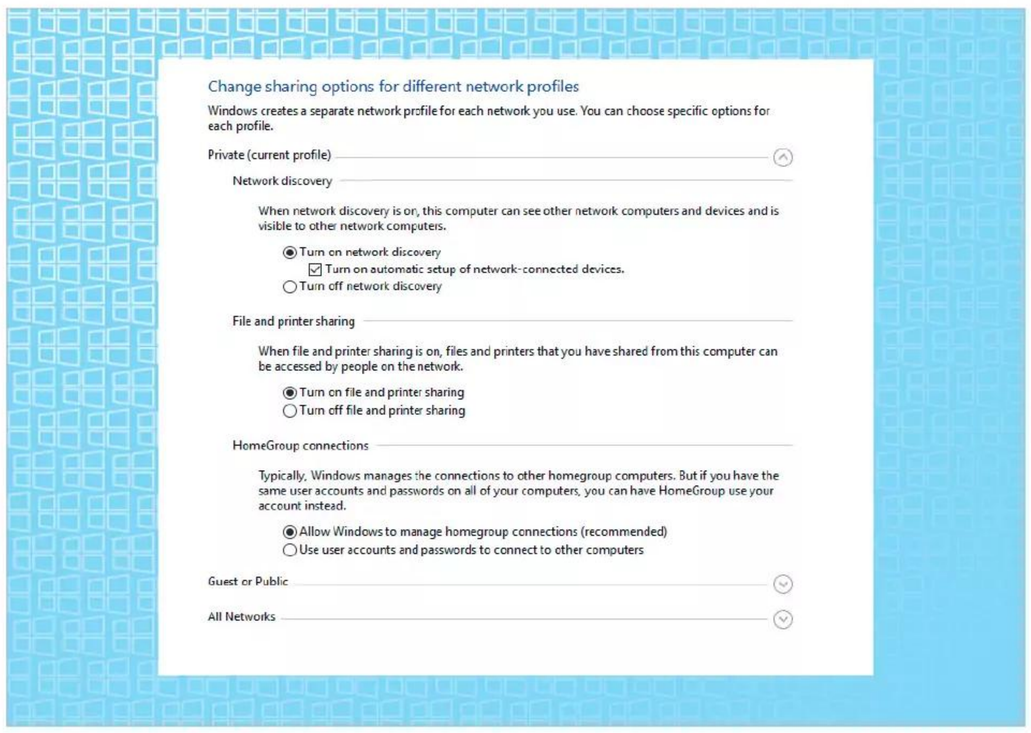
TIP 4 Ensure you use the latest antivirus and antimalware definitions for your security client. If you're going to use public Wi-Fi, make sure you're up to date prior to leaving, especially airport Wi-Fi points, and that the client is in good working order.



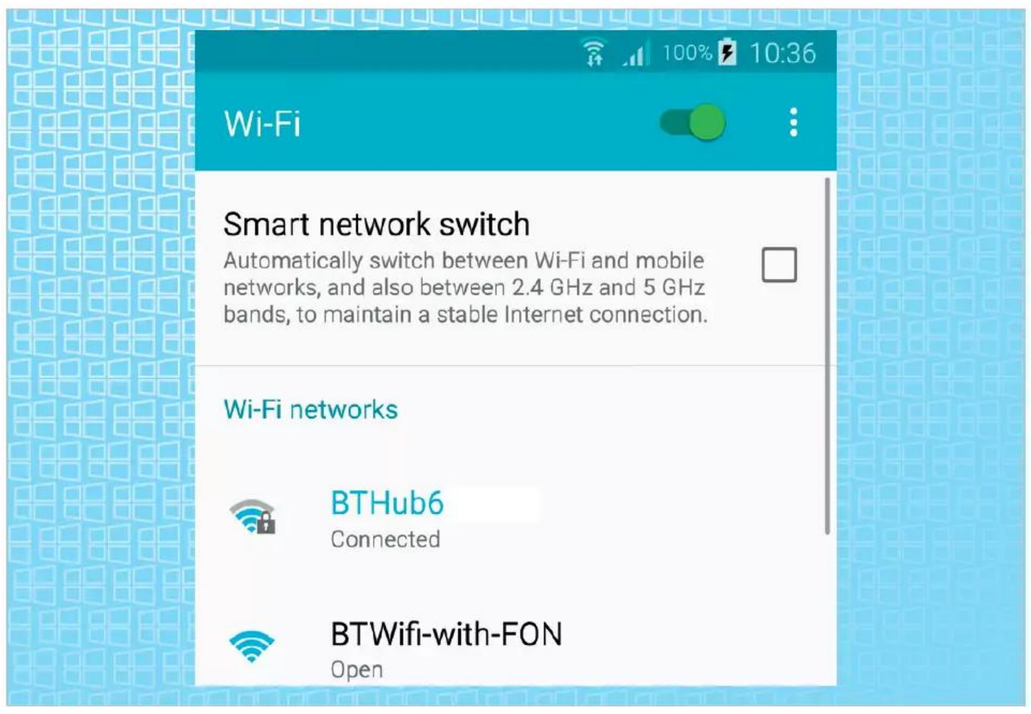
TIP 5 Always use HTTPS to access any website. This means that the information and data packets will be sent and received in an encrypted form and will make it exceedingly difficult for a hacker to decipher them. If possible, use an add-on such as HTTPS Everywhere for your browser of choice.



TIP 6 Turn off file sharing when you're using a public Wi-Fi access point. Whilst it's great to share your content on your home or work network, once you start using another network, your computer could start sharing that data with anyone who's also connected to the same network.



TIP 7 If you're not planning on using any public Wi-Fi points, then make sure that the Wi-Fi is turned off on your laptop, phone, tablet and other devices you have on you. There are instances when a device can automatically attach to any available network, unless otherwise told not to.



TIP 8 Using a VPN when accessing a public Wi-Fi point is a fantastic way of protecting your data packets. They can still be intercepted but the VPN client encrypts all outgoing and incoming data with the highest possible levels, making it virtually impossible for a hacker to decode.

TIP 9 To avoid shoulder surfers, make sure that the area behind you is clear and enter passwords etc. via your keyboard in the same way you'd protect your card details in an ATM. Cover your keyboard as much as possible and make a point of looking around to make sure no one is watching you over your shoulder.

TIP 10 If possible, always use a two-factor form of authentication. For example, some banks will utilise both a login from their website as well as a text sent with a unique code to a registered phone number. This way you ensure that the banking site is legitimate and a hacker can't go any further without the SMS pin sent by the bank.

How to Secure Your Devices

Mobile device hacking is on the rise. Most people now carry a phone or tablet around with them all the time, containing their emails, browser data, photos and enough personal information for someone to be interested.

Ten Tips for Safer Mobiles

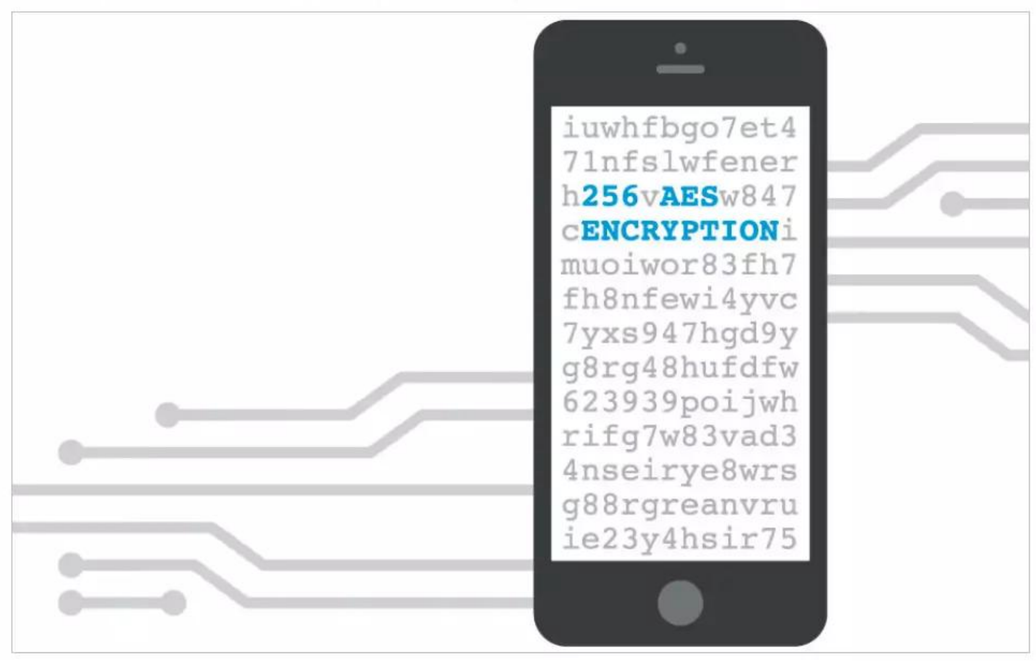
Your personal information is worth quite a bit to the right group of people. It's not just Windows security you need to keep in mind, you need to consider your mobile security too.

SECURITY LOCK

Locking your device is one of the most basic of security tips for mobile devices. Either use a number code, pattern lock or finger print to lock your device when not in use. Should someone steal it, it becomes a little more difficult for them to gain access. That won't stop a professional digital criminal, but it will deter the rest.

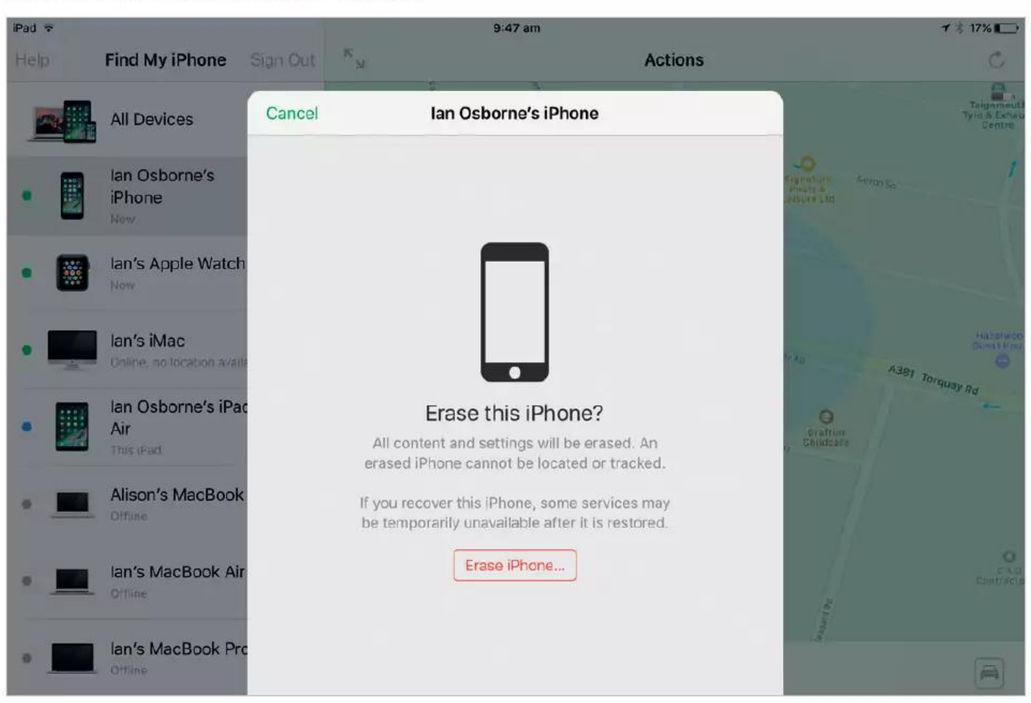
MOBILE ENCRYPTION

It's possible to set up data encryption on mobile devices these days. For example, you can encrypt the entire device or just the part that contains emails and personal or banking data. Either way, encryption will protect the contents of your device.



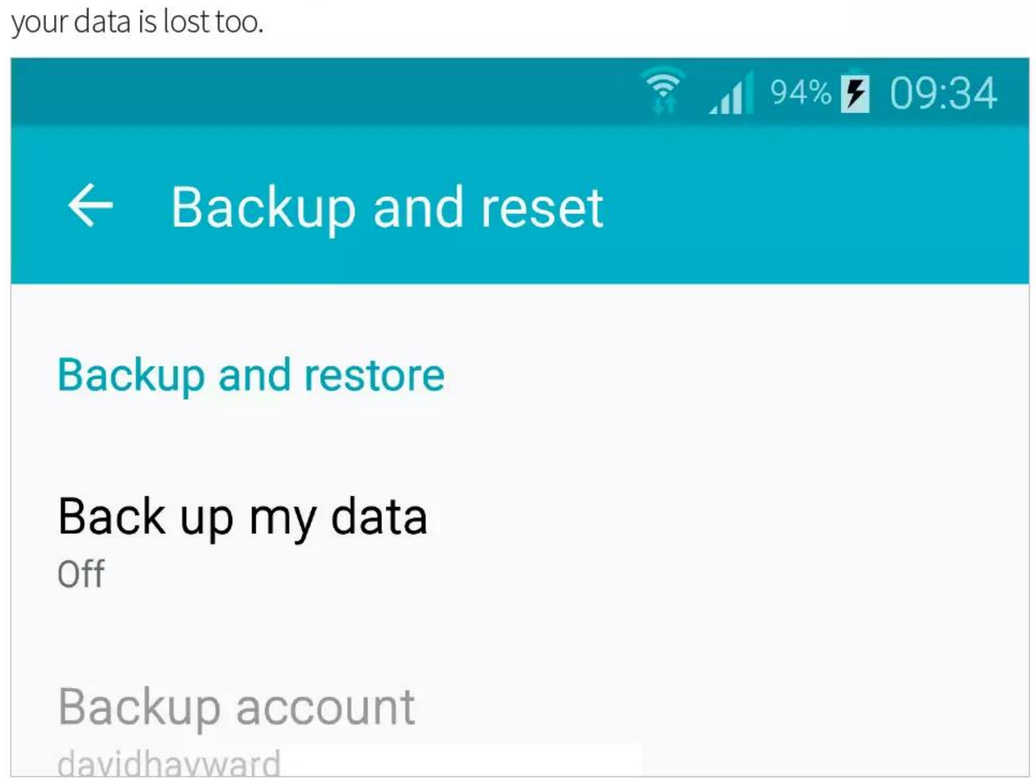
REMOTE WIPE

If possible set up some form of remote wipe. Should your phone or tablet be stolen or lost, you'll be able to use another Internet connected computer to send a delete signal to the lost device. You may never see the phone again but at least the personal data within is now out of the hands of others.



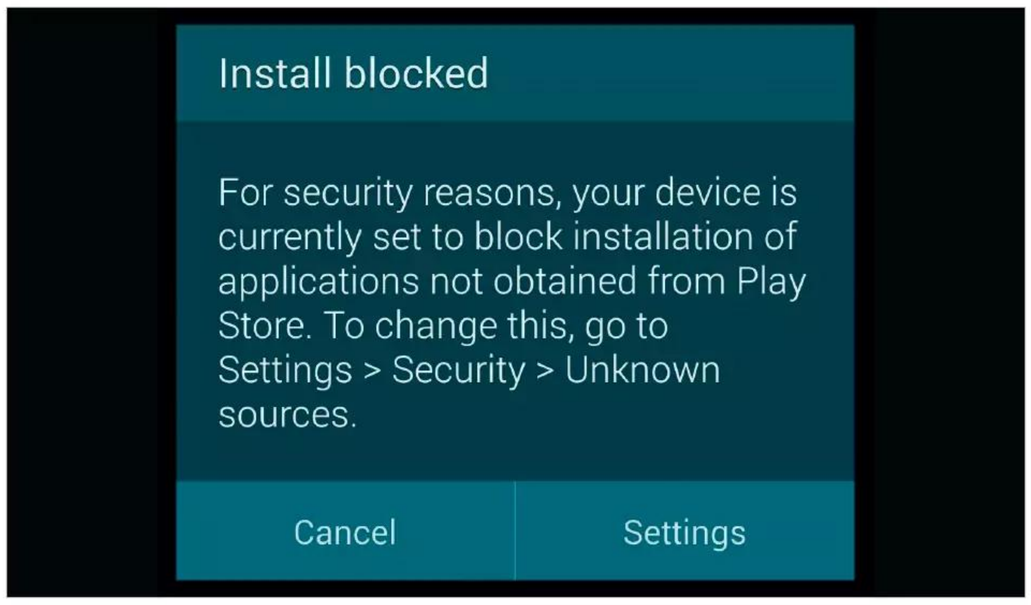
BACKUP DATA

Make sure that the data you have on your device is regularly backed up. You may have umpteen security elements in place but if the device is lost and you haven't made a backup, then your data is lost too.



BLOCK INSTALLATIONS

Try to avoid installing third-party apps. iOS devices are covered in this regard thanks to Apple's walled garden approach to its app store. However, Android users are particularly vulnerable. Don't install anything from an unknown source and research plenty before installing anything.



NO ROOTING

Avoid jailbreaking or rooting your device. Whilst it's regarded as a positive process, to remove the built-in software from the manufacturer and give you control over the device, it often also opens your device to backdoors that were previously sealed. Unless you know how to properly secure a device, leave rooting alone.

UPDATE SYSTEM

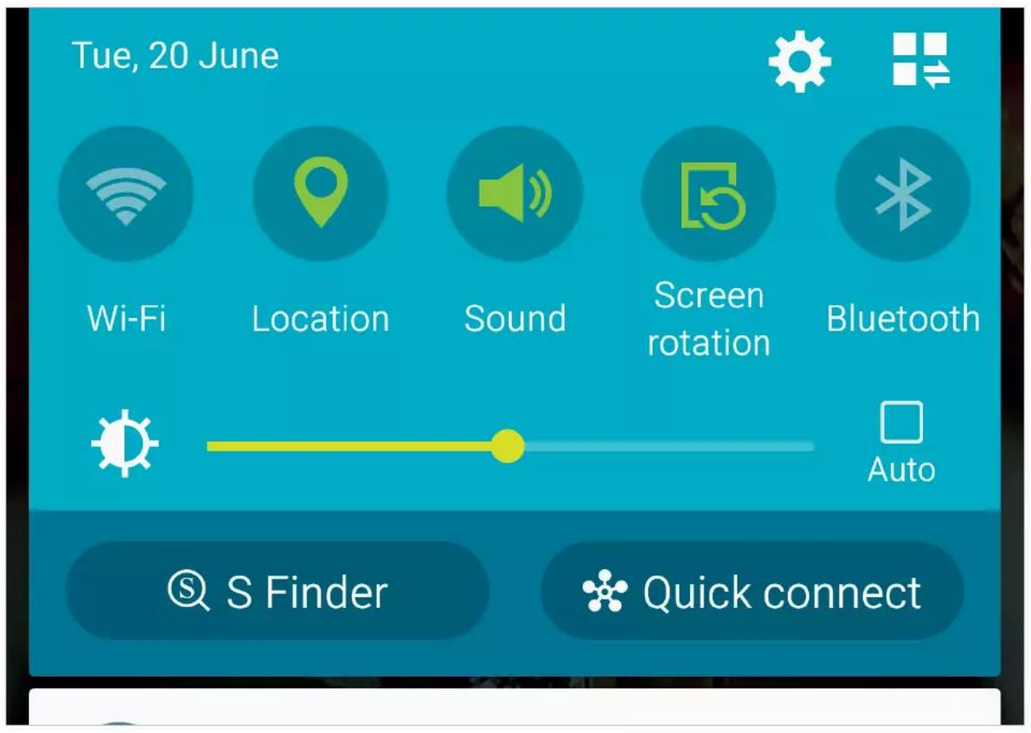
Keep your system as up to date as possible. It can be a pain having to frequently accept update and upgrade messages from your device, and waiting for the OS or the app to update itself, but more often than not an update will provide much needed security patches.

FALSE TEXTS

Be aware of social engineering phone scams, Vishing and Smishing in particular. Criminals love sending false banking texts, links to fake websites and all manner of other scams designed to gain access to your personal information.

POWER OFF WI-FI

Remember to turn off your Wi-Fi when you leave the home or office network. If you desperately require Internet access and don't want the data charges, then consider using a VPN if you're connecting to public Wi-Fi points.



MOBILE AV

Download and install a good mobile antivirus and malware tool set. Bitdefender, McAfee and all the other major security companies offer a mobile version of their products and with it you'll be better prepared for any potential cyber attack.

How to Secure Yourself on Facebook

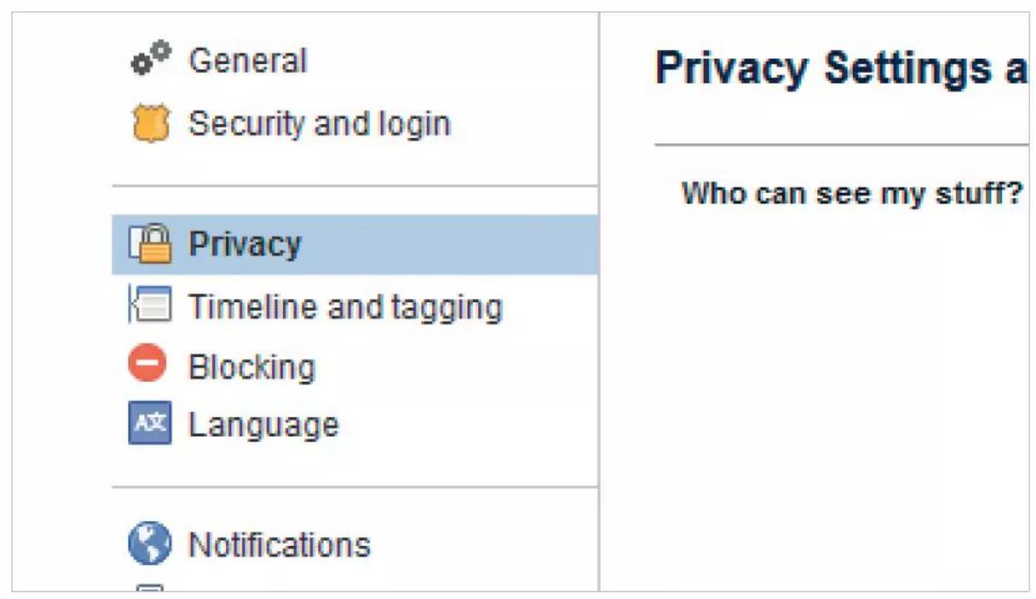
Facebook has become one of the best sources for cyber criminals to gain personal information on the Internet. Without realising it, a user is giving out reams of data and in most circumstances they're making it public.

Tips for Better Facebook Profiles

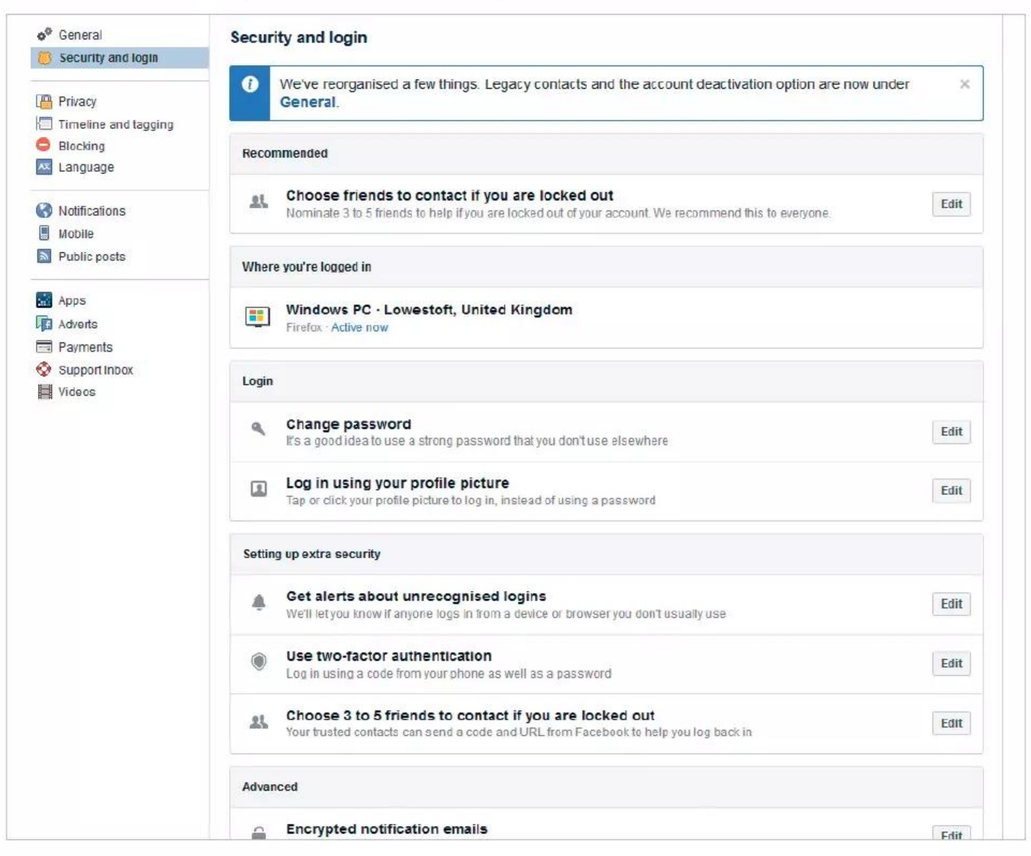
The dangers of social media aren't just for young people, many adults have been duped into befriending someone they don't know and exposing their personal information.

Facebook's policy forbids the use of fake names but it does allow nick names to be used. Where possible, use your nickname instead of your real name. This will effectively hide your real name details from those who would wish to exploit it.

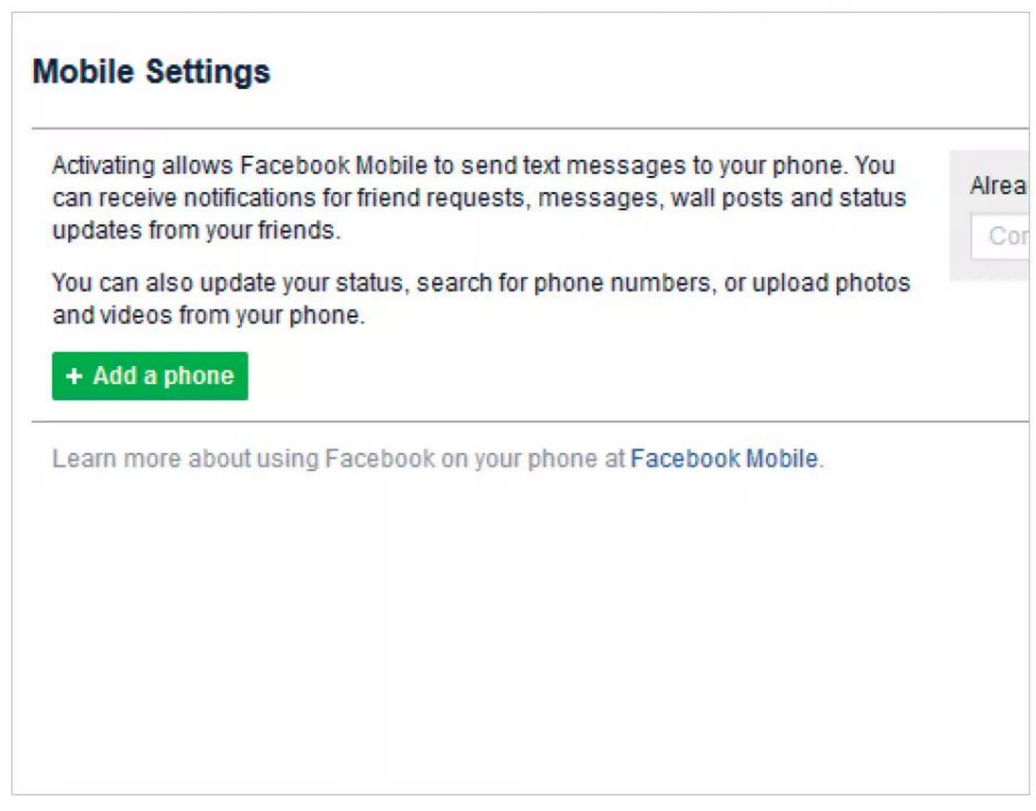
Go to Settings > Privacy, and make sure that the Who can see my stuff section is set for just friends, as opposed to friends of friends or public. This will effectively hide your Timeline contents from others and only your confirmed friends will be able to see any updates.



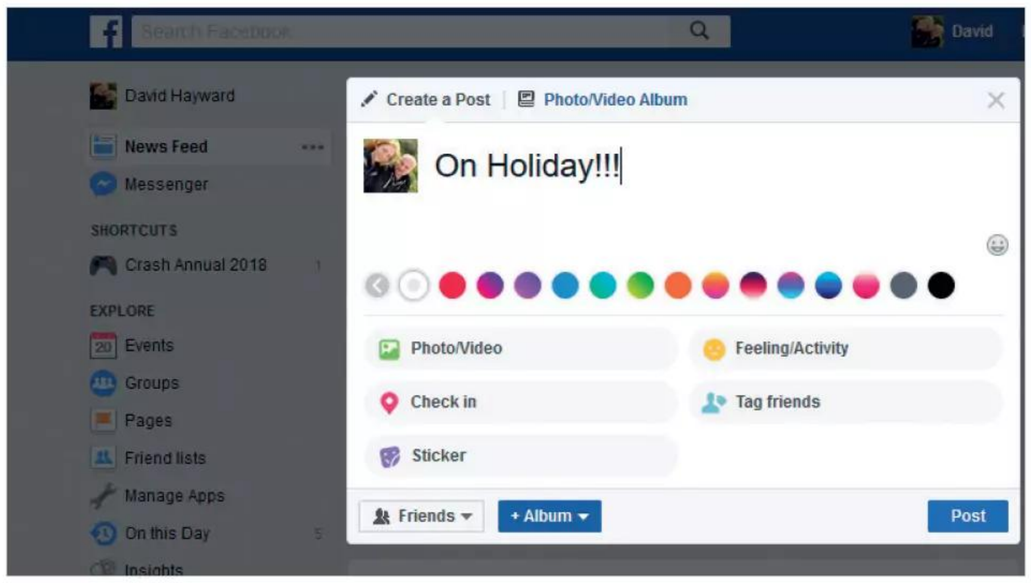
Set up two-factor authentication, alerts about unrecognised logins and make sure that emails from Facebook are encrypted. These can all be found in the Settings > Security and Login section.



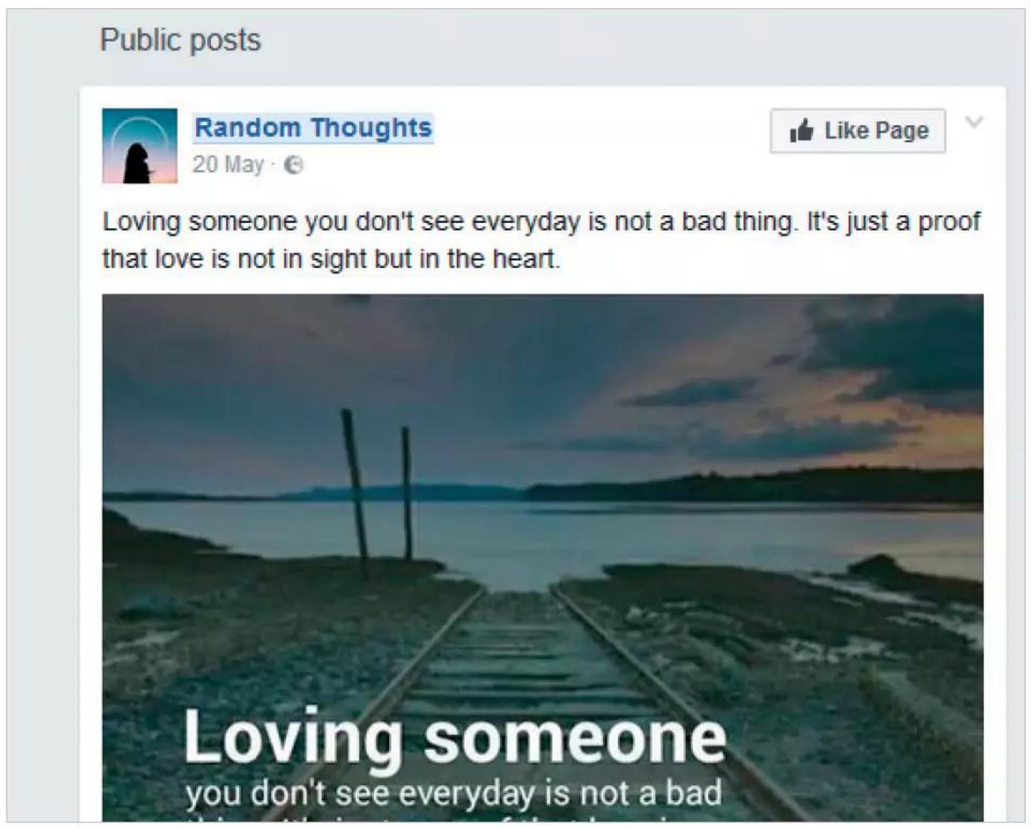
Never post any contact information on your profile. We often automatically start filling in the phone number field on a site but take a moment to consider what the ramifications could be should your number be made aware outside your circle of friends. That also includes house address too.



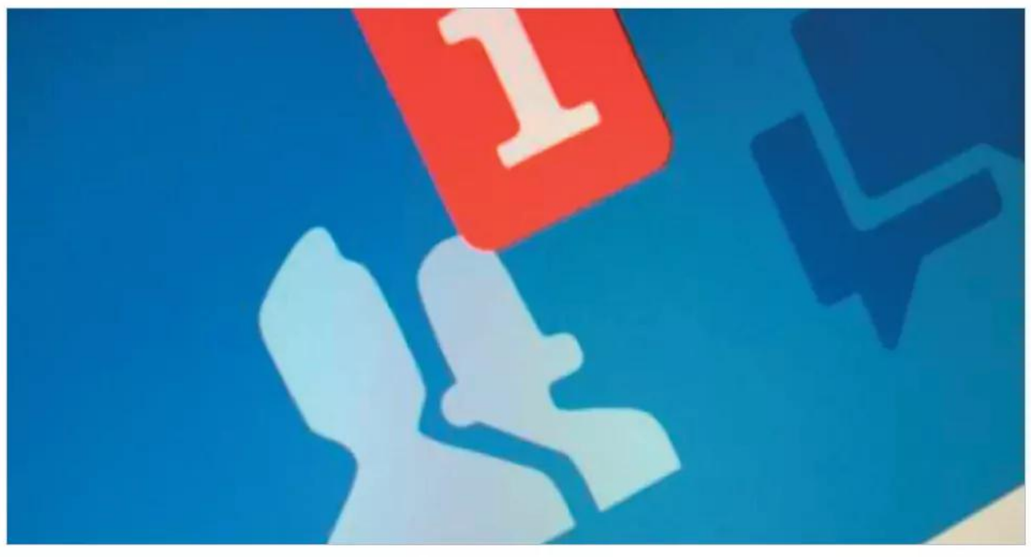
Tempting as it may be, try to avoid posting your location. Whether you're at home alone, or you're on holiday, should that information be made available then a criminal will know that your house is empty or worse, that you're alone in it.



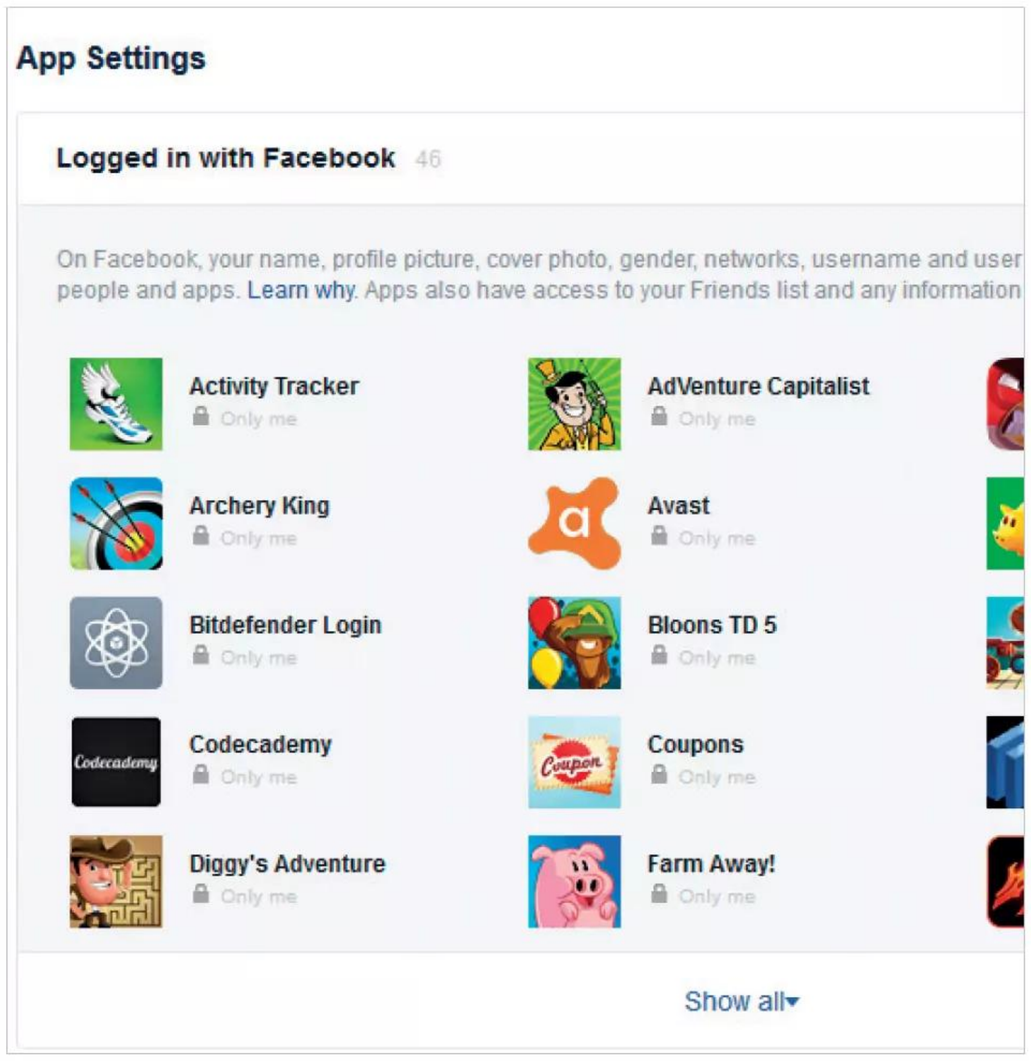
Try and avoid sharing random thoughts of the day, inspirational quotes, fake news or other such items that appear on your Timeline from others. Often these instances are created to farm for shares and likes and as such can often be traced back to individuals who are simply looking for active Facebook accounts.



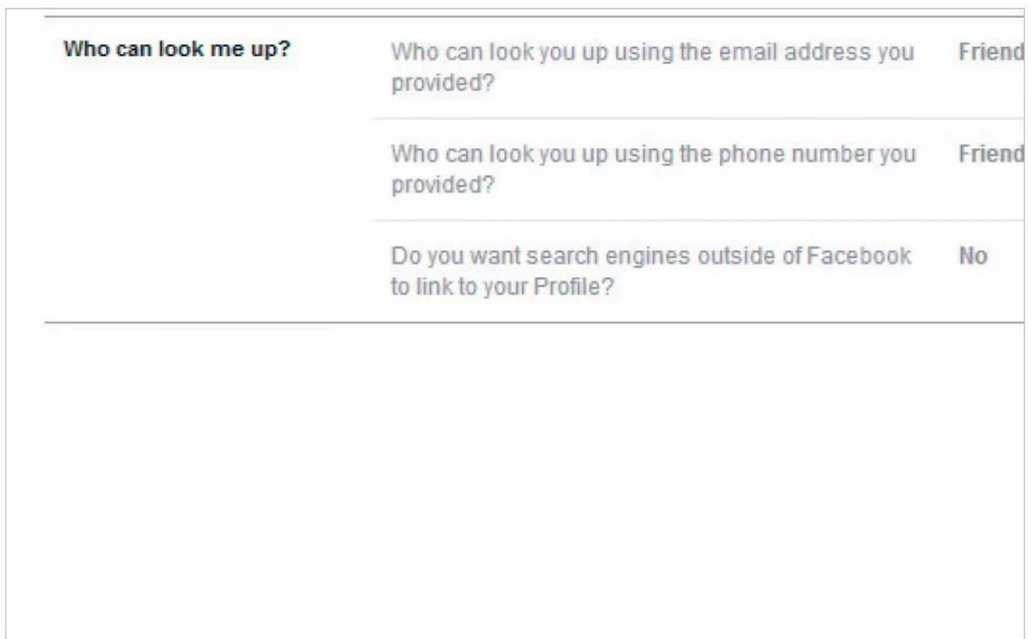
Try not to accept every friend request you get. Take a moment to check the person out and if necessary message them to find out who they are and how they know you. If their comment is something like 'we met at the bar last month' then it's best to ignore the request, as they could be fishing for information.



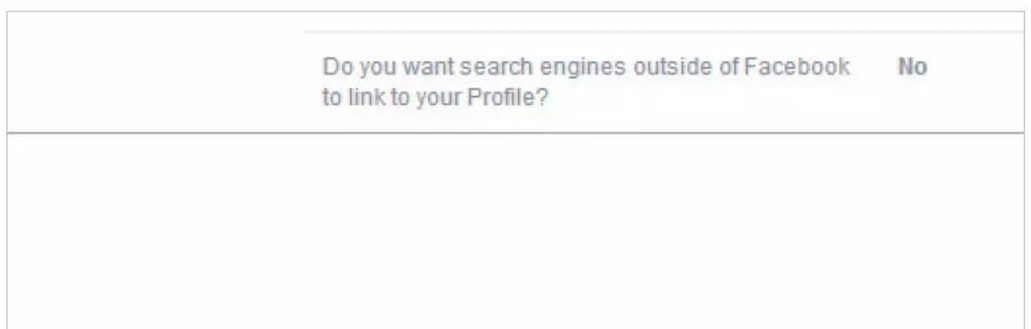
Not all apps you install on your phone or tablet are good. Take a moment to read what an app will try to access when it's installed. Often a rogue app will attempt to access your Facebook account to farm for your and your friend's information.



Whilst in the Settings > Privacy section, consider editing the default options for the Who can look me up fields. These will prevent the public, or even friends of friends, from being able to find you on Facebook, which in turn adds a higher level of security to your account.



Finally, ensure that the Do you want search engines outside of Facebook to link to your profile option is set to No. This will hide you from someone who has entered your name into Google in the hope that they might be able to find your Facebook account.



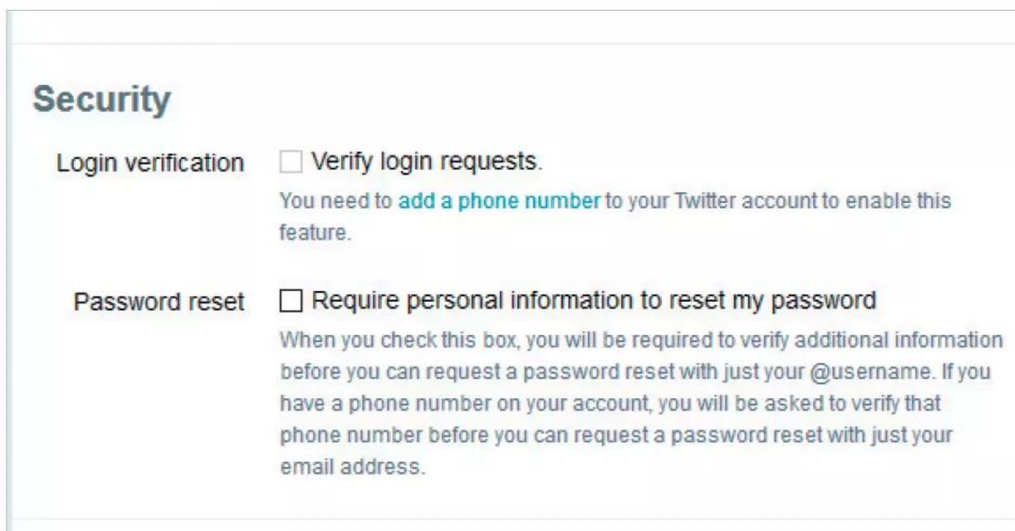
How to Secure Yourself on X FKA Twitter

X formly know as Twitter's success has boomed in recent years. Where once it was simply one of the more popular social media platforms, thanks to presidential candidates and scores of celebrities, it's fast become the modern media phenomenon.

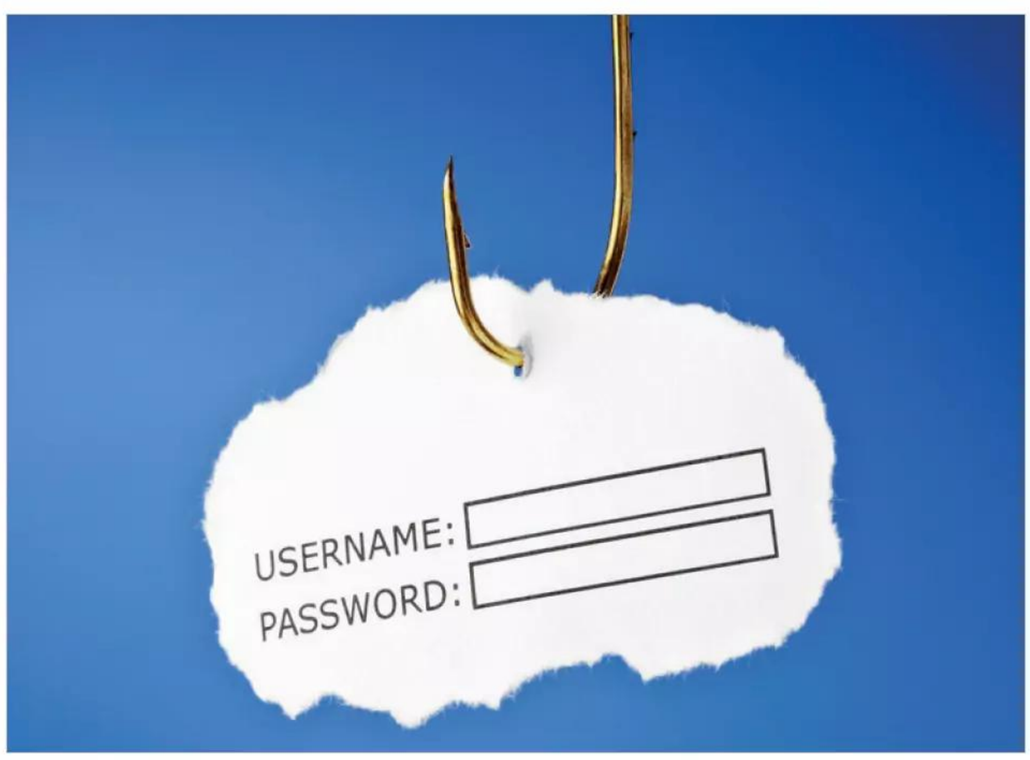
Securing the X-verse

Sadly, due to its popularity, Twitter is a hotbed of scammers, spammers, hackers and social engineers scouting out the next potential victim for monetary gain, or simply behaving abusively. Here are ten tips to help secure your Twitter account.

If you click on your profile picture and choose Settings and Privacy from the menu, you're able to set up a form of two-factor authentication called Verify Login Requests. This will enable Twitter to use your phone number to send texts for any login requests. So even if your password is compromised, the hacker can't get in without the text code.



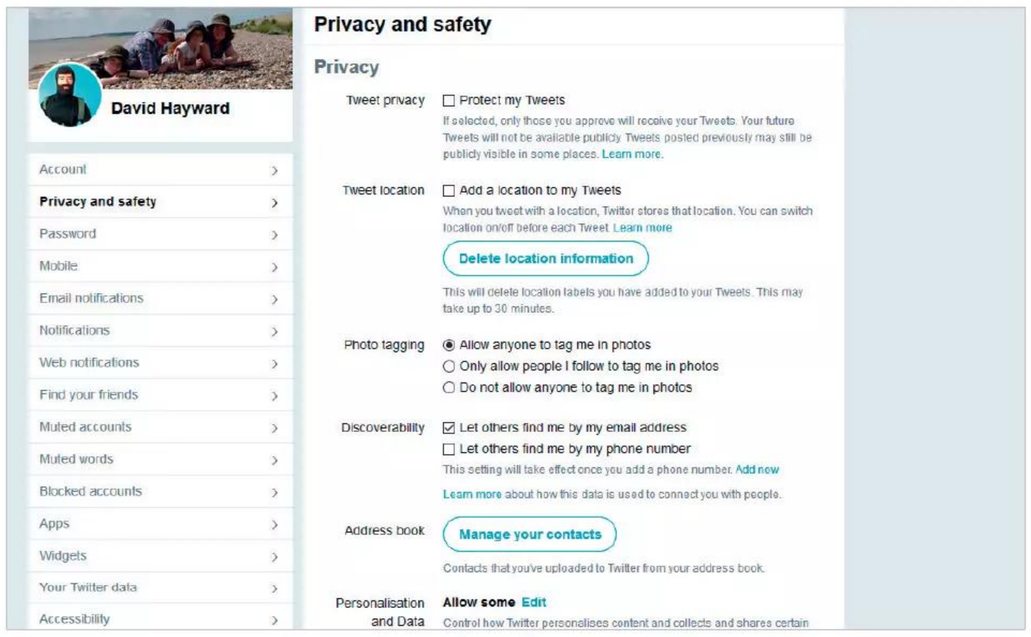
Just like most other social media platforms, phishing scams are rife on Twitter. Be wary of anyone sending you Tweets claiming to be someone you know, offering a too-good-to-be-true job or even informing you that your account is compromised. It's likely a phishing scam, so delete and report the instance to Twitter.



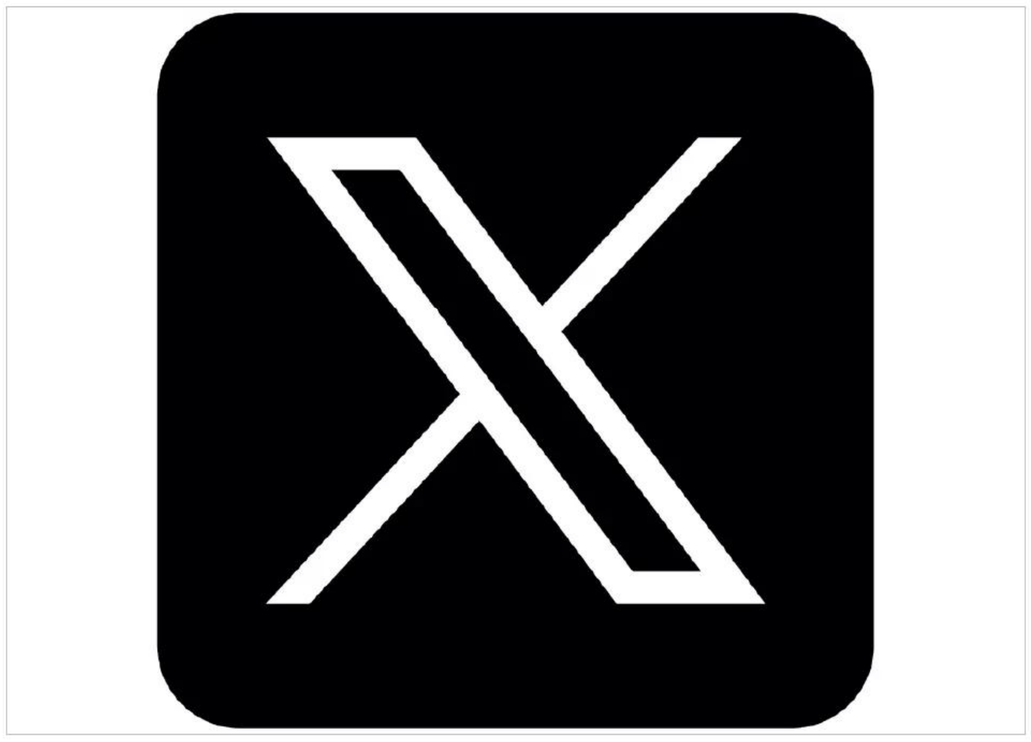
We've previously mentioned the fact that using weak passwords is, unsurprisingly, not recommended. However, you'd be amazed at how many people still use the likes of 'password1234' or something similar. Set a good, strong password that will take some cracking.

There are many accounts on Twitter that simply aren't real. These bots, as they're known, can be programmed to post daily amusing, inspiring and socially acceptable Tweets. On the flip side, other bots are designed to Tweet suspicious links to virus-infested websites. In short, unless you trust the account, don't follow any links.address too.

Within your account settings, you'll see a menu to the left with a Privacy and Safety option. Click this to enable Twitter privacy, Discoverability, Direct Message notifications, the ability to hide sensitive Tweets and the removal of blocked accounts. It's worth going through the list to further secure your account.

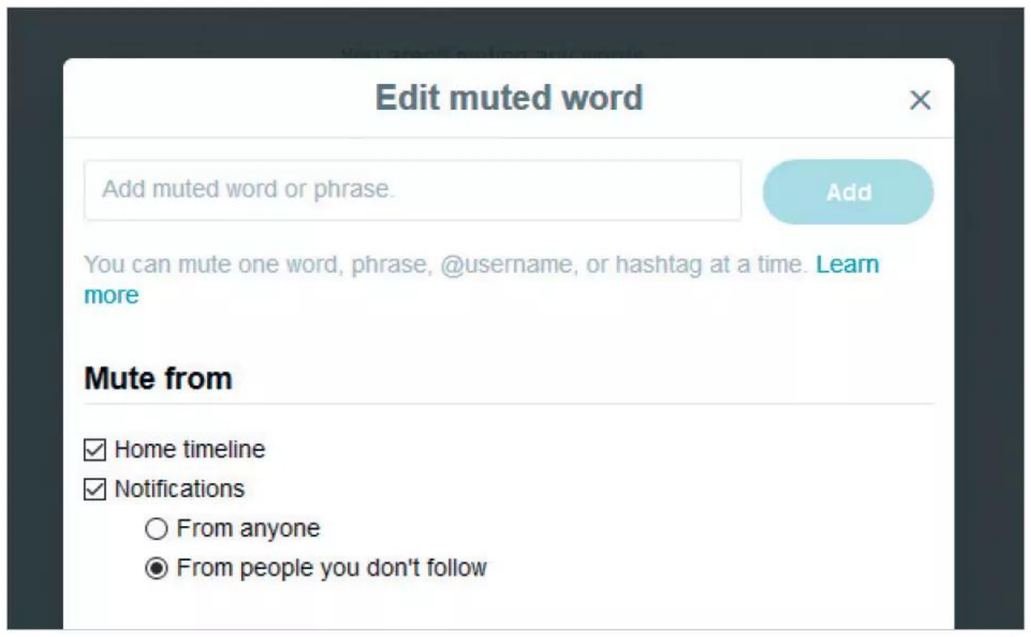


Direct messaging in Twitter is both advantageous and dangerous at the same time. Whilst great for communicating directly with another user, it's also used by others to lure in victims or send links to malicious websites. It's best to ignore most messages unless you know who they're from.

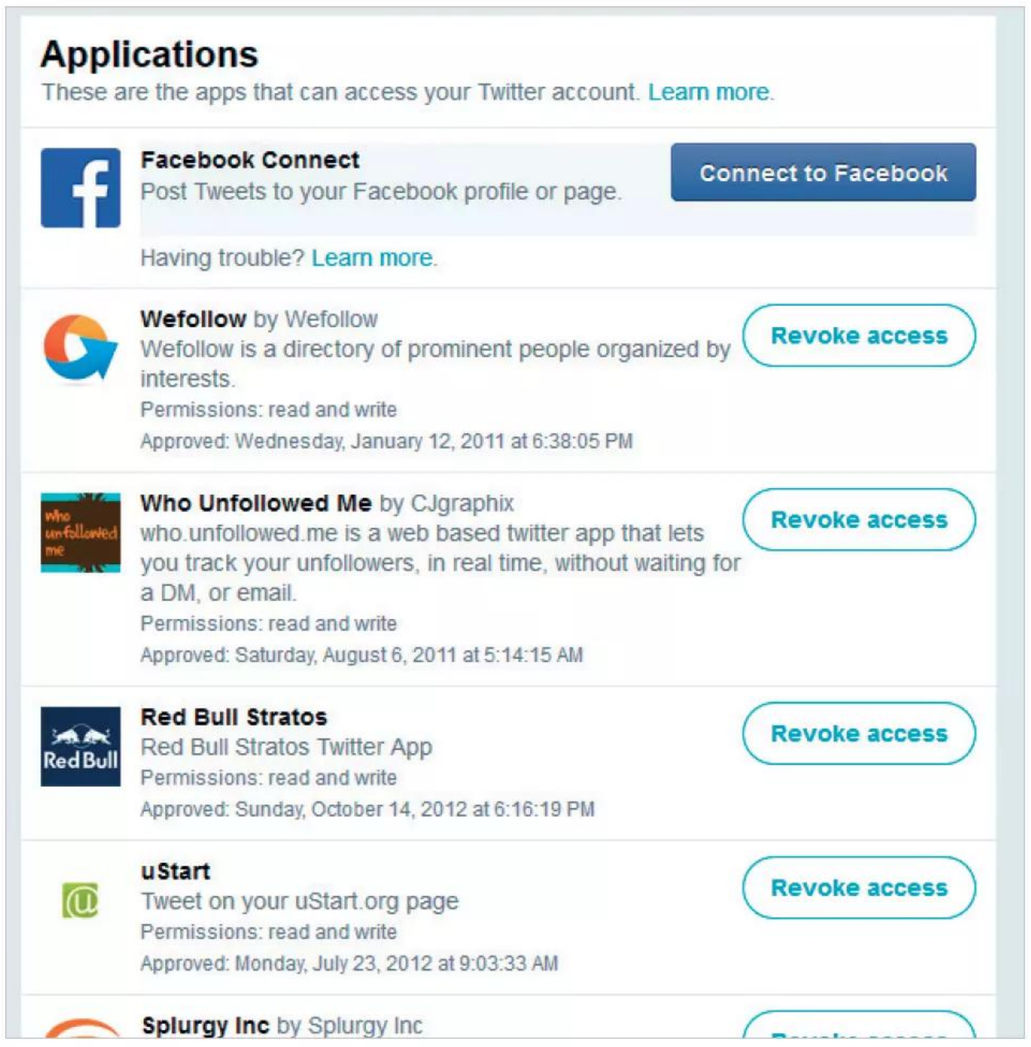


If you use your Twitter account to login into any third-party apps or games, then you may need to consider setting up a secondary Twitter account. Whilst convenient, some apps can be hijacked to collect account details, leaking them to hackers.

Word Muting is an excellent feature within Twitter's account settings. With it you're able to mute any words you don't want to see in your notifications or timeline. There are often Tweets you'd like to avoid even seeing in your timeline, so muting them is an ideal solution to help keep your account clean and free from negative aspects.



It's always worth browsing through the Apps section in the Twitter options. This is where you can allow or revoke access for any apps you've used via the Twitter account; and you can also see what rights each app has to your Twitter account.



Like Facebook, be careful of what you post. It's nice letting others know you're off on holiday to the Bahamas for several weeks but there could be a rogue account that's now informed of an empty house; and if you were foolish enough to mention your address in previous Tweets, they know exactly where to go.

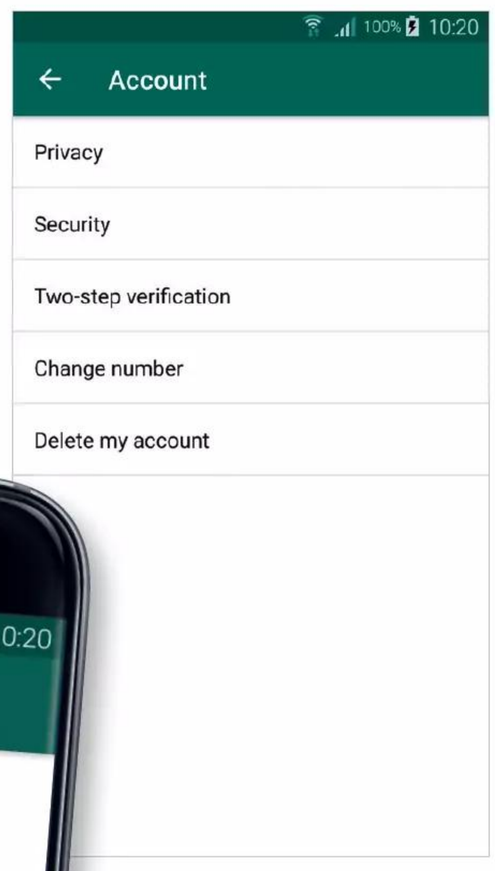
How to Secure Yourself on WhatsApp

With over a billion users worldwide, WhatsApp is proving to be a force to be reckoned with in the social media marketplace. This messaging app was released over eight years ago and developed by the Facebook team; since then it's become the most popular messaging app.

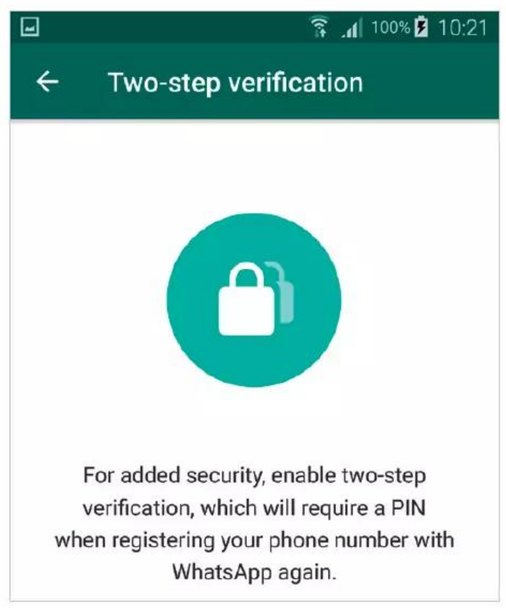
WhatsApp Security Tips

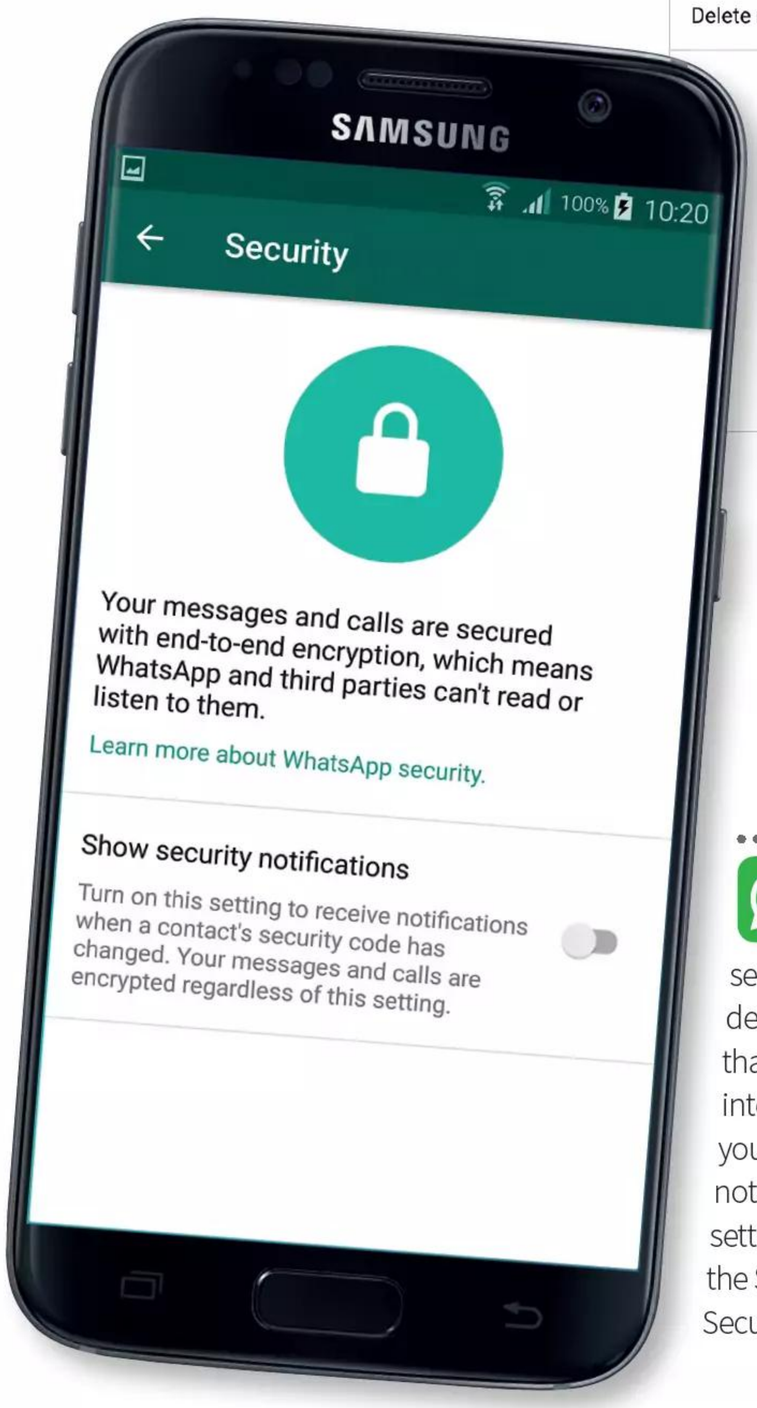
With this popularity comes a darker side to messaging. Accounts of terrorists using WhatsApp, along with hackers, scammers and all manner of nefarious individuals and groups are ever in the popular media.

Protecting your WhatsApp account can be done mainly through the Settings > Account > Privacy option. In here you're able to secure your personal details, profile, status, messaging and who can see your account.

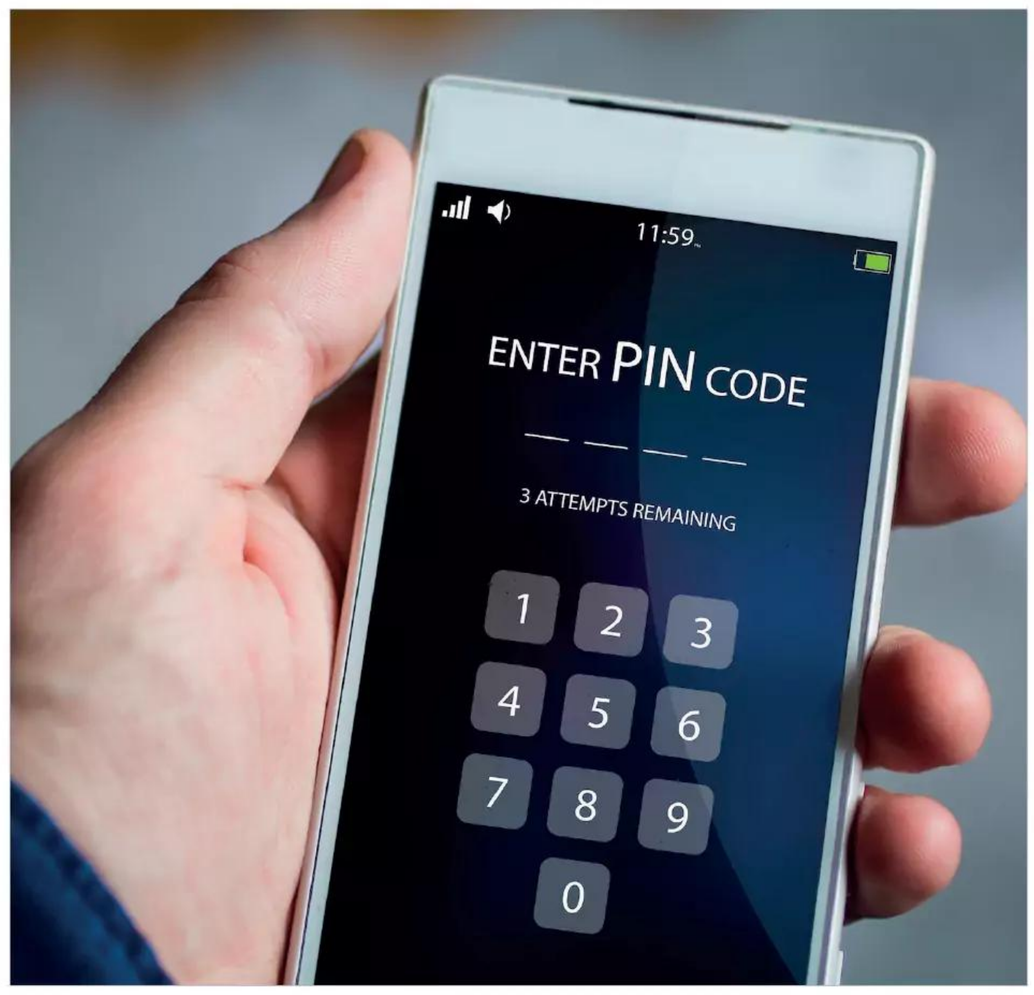


For added security you can opt for two-step authentication, which will require a PIN when registering your phone number with WhatsApp. This is an absolute must for those who use the app regularly.





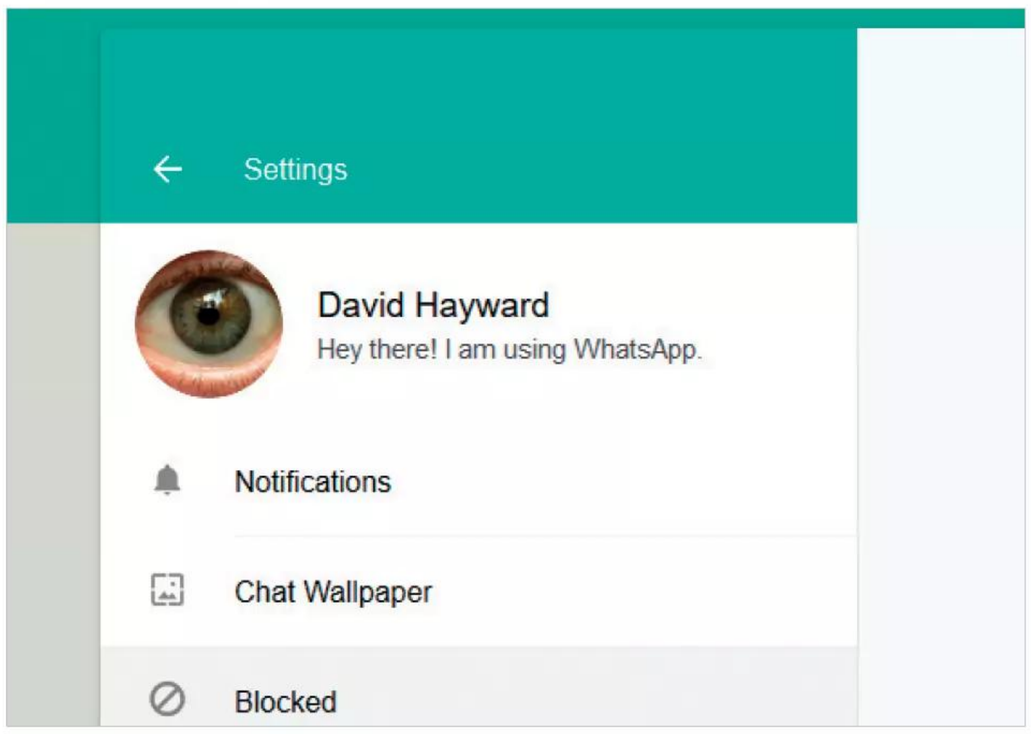
Beyond WhatsApp itself, make sure that your phone or tablet is securely locked with an access PIN, pattern, facial or finger print recognition system. This way, should you lose your phone, it will be locked against anyone who tries to access it and WhatsApp.



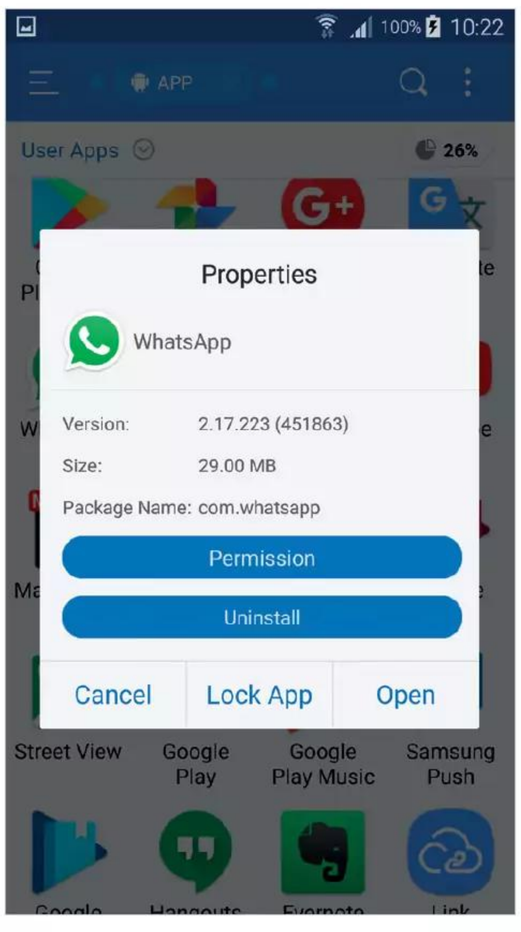
Thankfully, WhatsApp already encrypts and secures messages sent from one device to another. This means that your data can't be intercepted and read. However, you can opt to view security notifications if a contact's security setting has been altered. This is in the Settings > Account > Security menu.

Generally you're not able to add users to your chat list if you don't already have them in your contacts list. However, clever phishing scams can have a victim add a contact, who can then message them using WhatsApp; as with all social media platforms, be wary of phishing attacks.

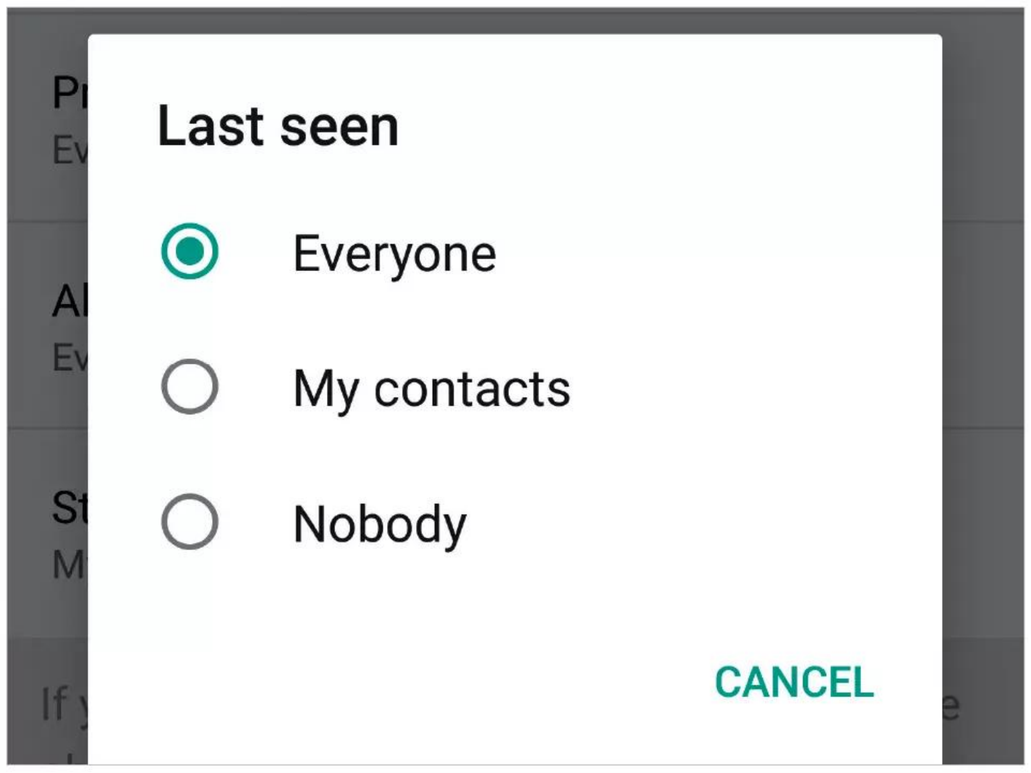
You can block users via the WhatsApp Web feature. Log into WhatsApp Web, and click on the three horizontal dots by your profile picture. Then click Settings and from there the Blocked option. You can select contacts to block from WhatsApp.



You can block all images from appearing on your photostream within WhatsApp. iOS users can look to their Settings then Privacy > Photos and deselect WhatsApp from the list of allowed apps. Android users will need to create a file called .nomedia within the WhatsApp images folder to stop the app from listing pictures.

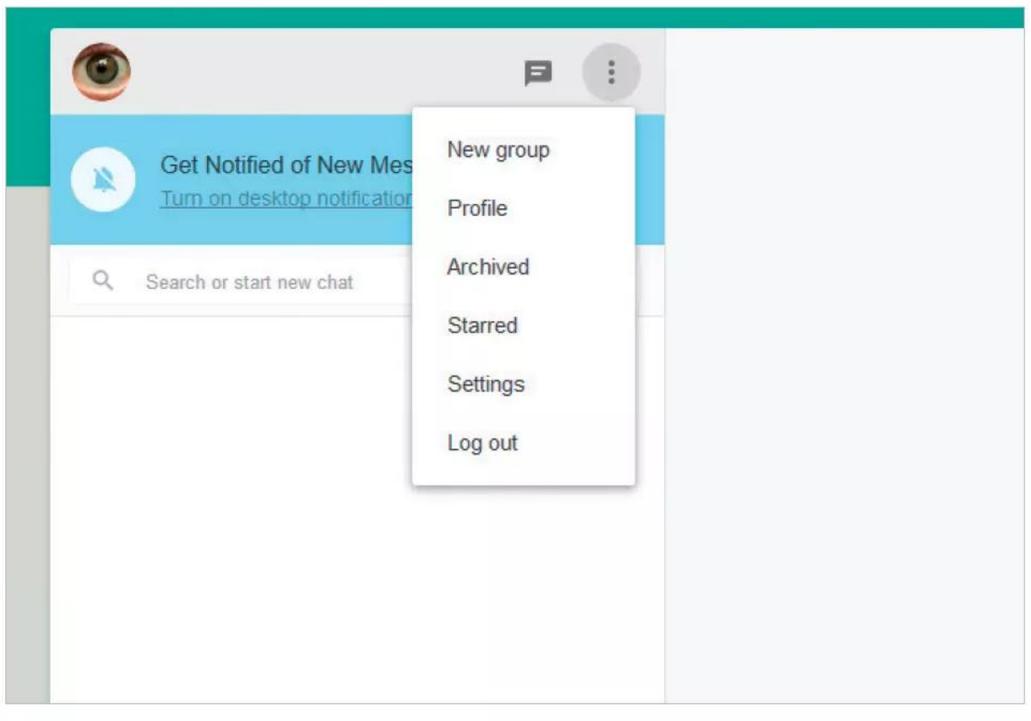


If you don't want WhatsApp contacts to see where you've been, you need to disable the Last Seen option within the Privacy settings. This will prevent other users from 'seeing' your movements. Should a malicious contact be added, they will never know where you are or have been.



Be wary of scams where you're contacted through other social media accounts informing you that your WhatsApp account has been compromised. These often request you to add a so-called legitimate contact, who in reality isn't, or visit a webpage that's riddled with malware.

If you use WhatsApp Web it's always best to ensure that you've logged out of it correctly before leaving your computer. The last thing you need is for someone to come over to your computer and view any conversations between contacts.



What to Avoid when Creating a Password

Creating a strong password sounds easy on paper but when you're presented with the password box it's easy to become stumped. Should you get past that part, there are also security rules to follow to further protect that password.

PA55W0RD1234

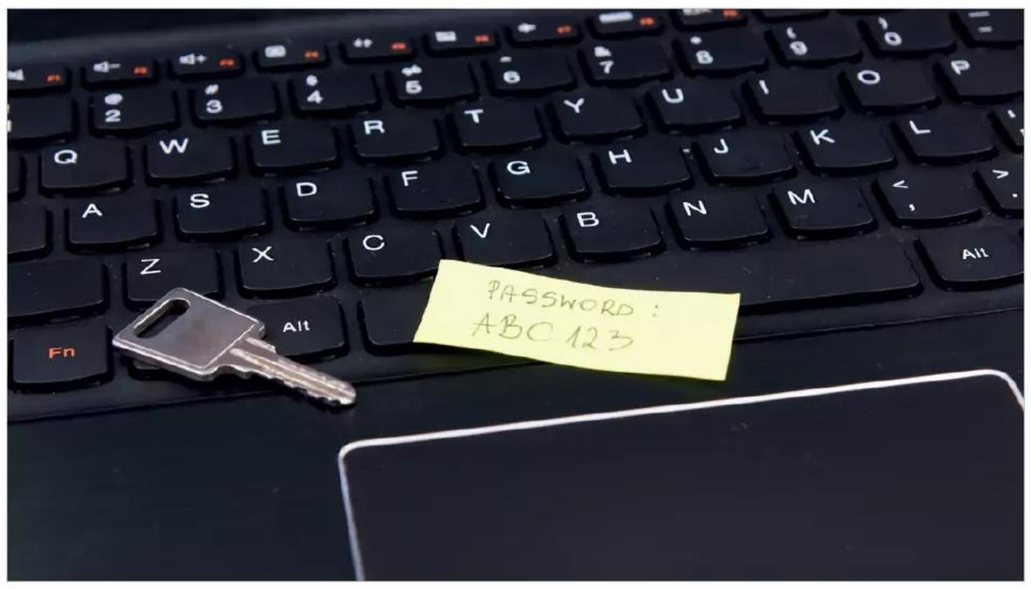
To help you create the perfect password, and secure it further, here are ten tips for happier password management. There's always password pitfalls but stick to these general tips and you should be okay.

OBVIOUS DATES

Never use your date of birth, partner's date of birth, children's date of birth, pet's names, family names or even the town where you grew up in. This is all information that can easily be collected from social media sites or even a clever Internet search.

VISIBLE PASSWORD

Never write your password down on a Post-It note or somewhere near your computer. It's not too difficult for someone to visit your computer whilst you're on a coffee break and read the note.

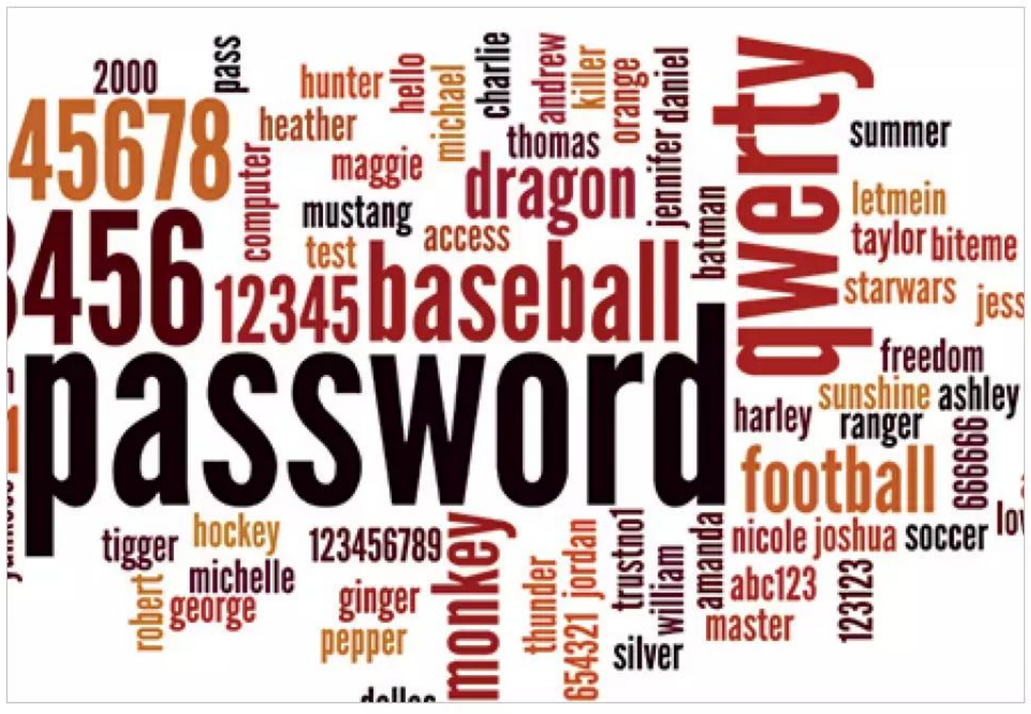


SAME PASSWORDS

Never use the same password for multiple sites. It's tempting and easy to have a single password for everything but should that password ever become compromised you will lose access to every site you visit, including any banking sites.

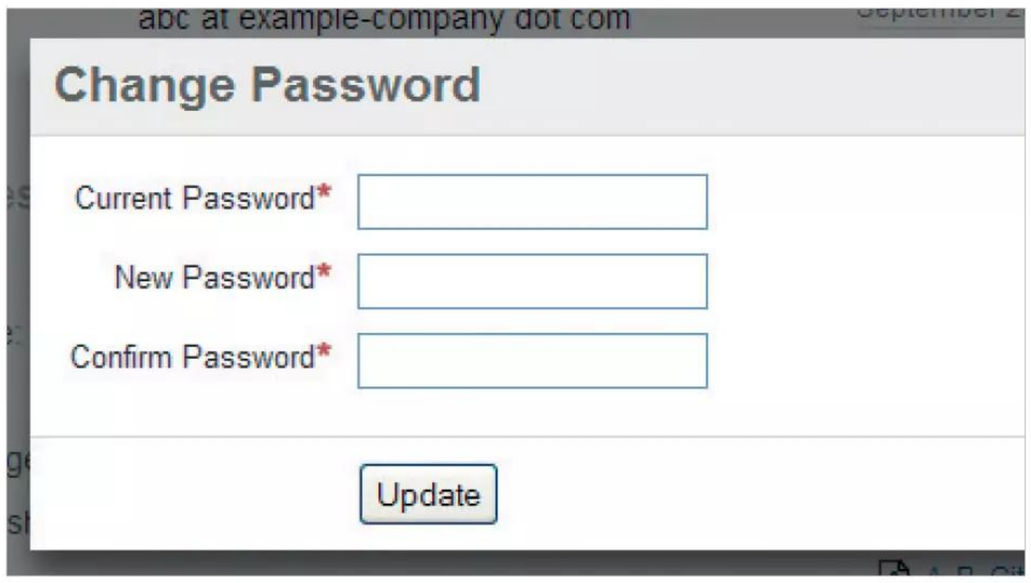
COMMON PASSWORDS

Try and avoid using common words in your password. Most password attacks are brute force, using dictionary words to gain access. Avoid using sequences of numbers, such as 1234. Instead, try inserting numbers, capital letters and symbols into words, such as C0m"o% instead of the word common, for example. However, avoid common words altogether if possible.



CHANGE REGULARLY

Regularly change your password. Most companies and good sites will require you to enter a new password that hasn't been used previously in the last few months every thirty days or so. If not, then you should actively keep changing your password yourself.



UNTRUSTED DEVICES

Never enter your password on a device or computer you don't trust. Entering your account details on a public computer, such as a kiosk or library, is dangerous as you don't know what protection these machines have nor whether they've already been compromised.

PUBLIC WI-FI

Try to avoid logging into certain sites when you're using public Wi-Fi. We've already covered how data on a public, free Wi-Fi access point can be intercepted. Your passwords, therefore, can be intercepted and viewed in plain text by a hacker.

LENGTHY PASSWORDS

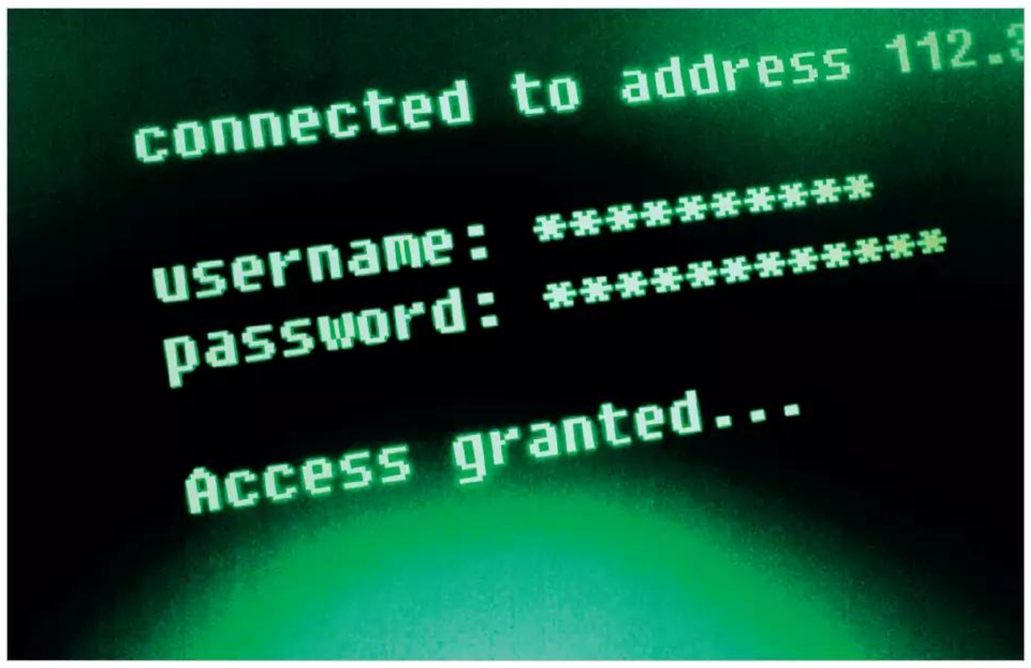
Don't use short passwords. The longer they are, generally, the harder and more complex it will be should anyone try to crack it. A longer password that also utilises upper and lower case, numbers and symbols can't easily be viewed by any shoulder surfers.

SECURITY QUESTIONS

In addition to creating a password, some sites also offer a rescue security question. Sadly most of these questions are a little too easy to get the answers for. Questions such as Mother's Maiden name, first pet, town where you grew up, etc. can again be obtained by the clever hacker.

STRONG PASSWORDS

A strong password isn't going to be easy to remember at first. For example, something like 8%&KY4&$XzwMhfrk will take a hacker around a hundred thousand years to crack but it hardly flows off the tongue. Find a happy medium and make your password as strong as possible.



Password Generators and Tools

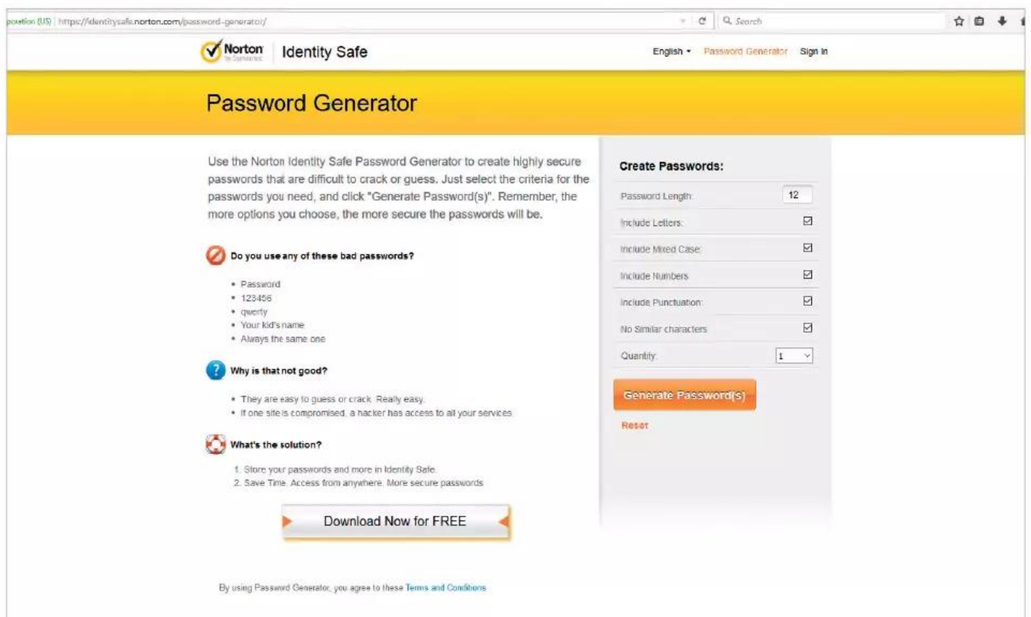
We've looked at some tips on what not to include when coming up with a strong password. However, it's not always as straight forward as that. Whilst some can come up with an elaborate and incredibly strong password, others struggle. Thankfully, there's help on offer.

Top Ten Password Generators

We live in an age where you don't have to sit with a dictionary and cryptic decoder to come up with an excellent password. There are many generators freely available to help you out. Here's our top ten.

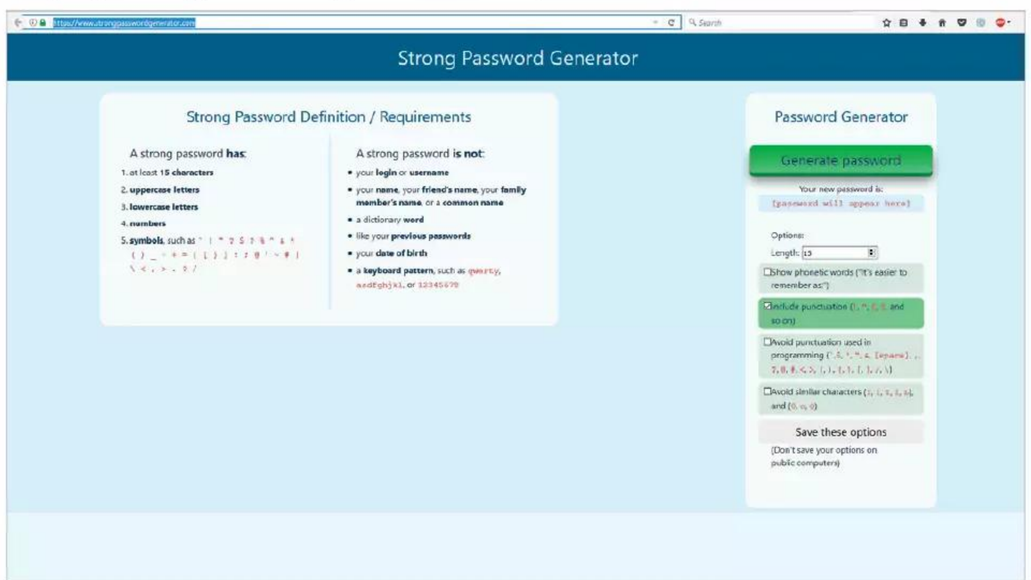
NORTON IDENTITY SAFE PASSWORD GENERATOR

Norton by Symantec, offers a handy free password online generator. You can set the password length, include letters, mixed case, numbers, punctuation and no identical characters. You can find it at: **https://identitysafe.norton.com/password-generator/**.



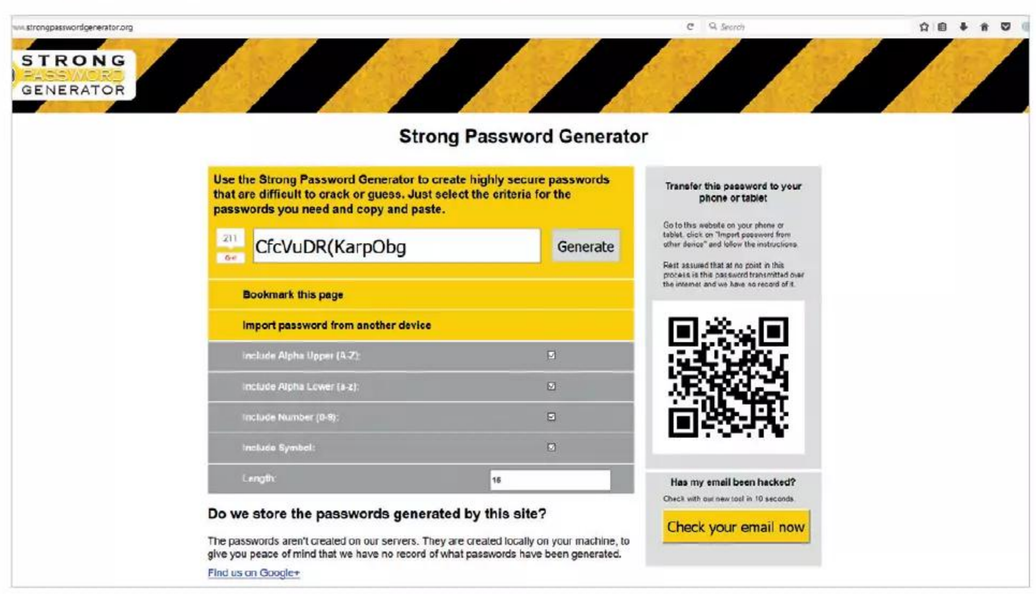
STRONG PASSWORD GENERATOR

Another great online resource that will create an incredibly strong password based on the options you choose. You can choose the length, punctuation and avoid similar characters but also display phonetic words to make it easier to remember. Try it out at: **https://strongpasswordgenerator.com/**.



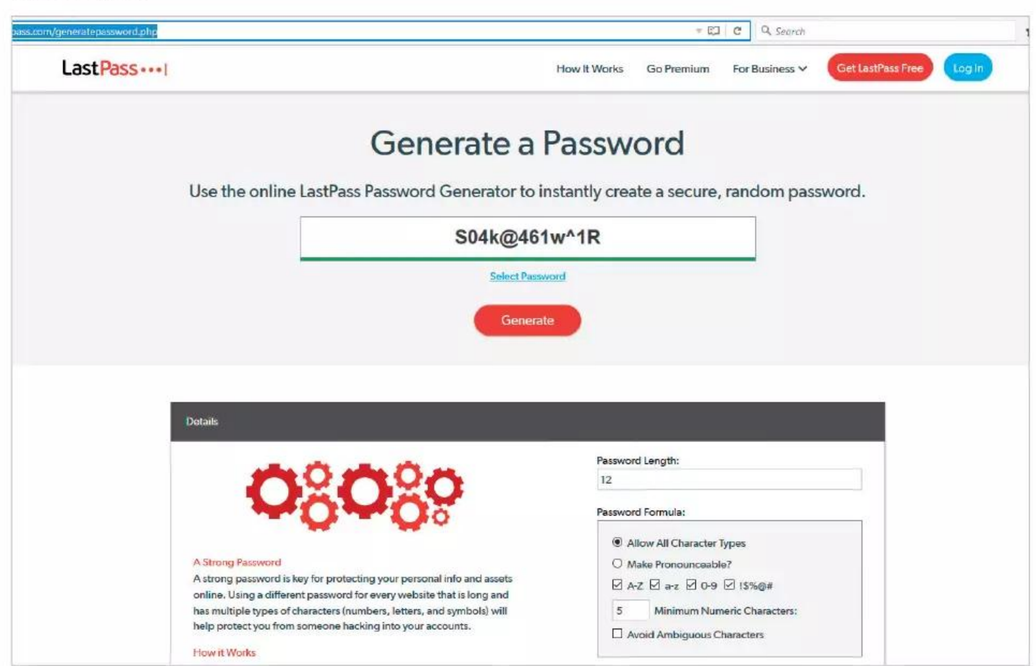
WIGHT HAT PASSWORD GENERATOR

This online password generator has been around for quite some time and has proved to be one of the best available for those after a unique and unbreakable password. There are ample options, and none of the passwords generated are stored remotely. Visit: **http://strongpasswordgenerator.org/** for more information.



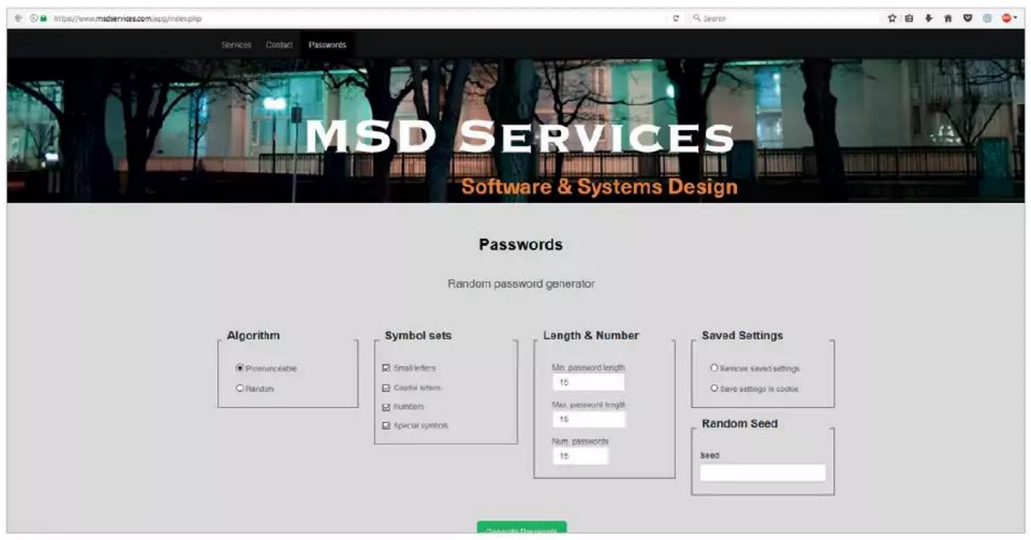
LASTPASS

LastPass is a popular password management program, which we'll look at in the next section; it also offers a free password generator. Found at **https://lastpass.com/generatepassword.php**, this excellent tool will help you create a strong and virtually unbreakable password in seconds.



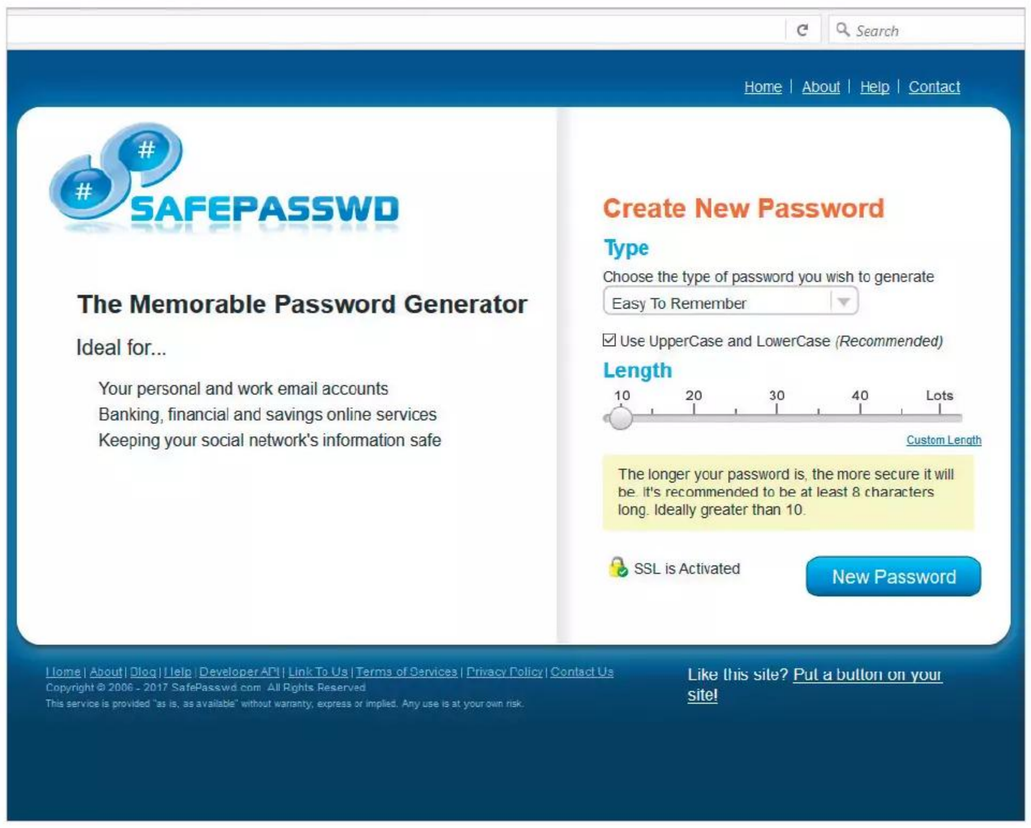
MSD SERVICES

An interesting site this, one that will allow you to create multiple unique passwords, based on length, upper and lower case, number and symbols as well as whether the end result will be pronounceable or completely random. It's at **https://msdservices.com/apg/index.php** for those after several passwords.



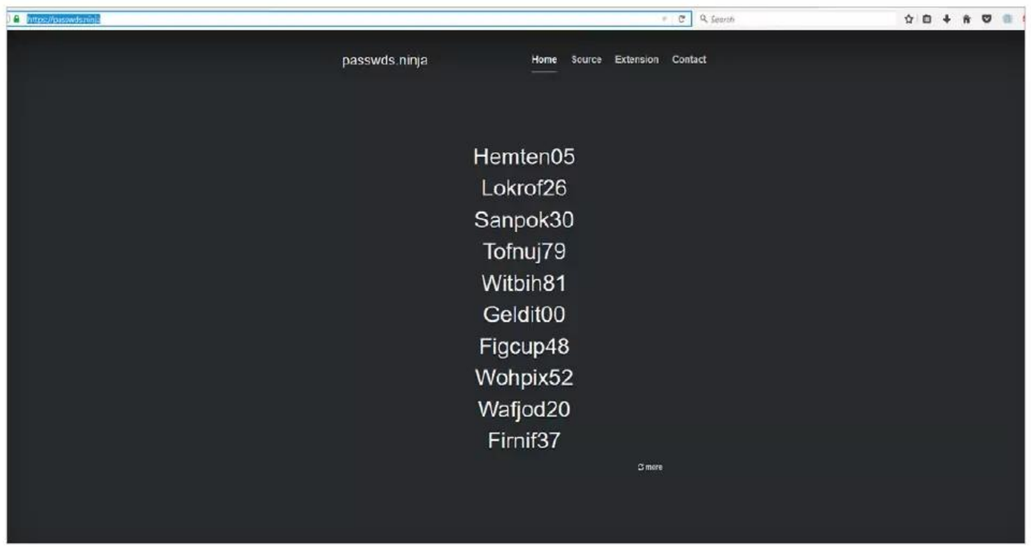
SAFEPASSWD

Another great site to have in your password arsenal. SafePasswd has been around since 2006 and is regarded as one of the best online password generators. The options are many and with them you can create something truly impossible to crack. You can find it at: **https://www.safepasswd.com/**.



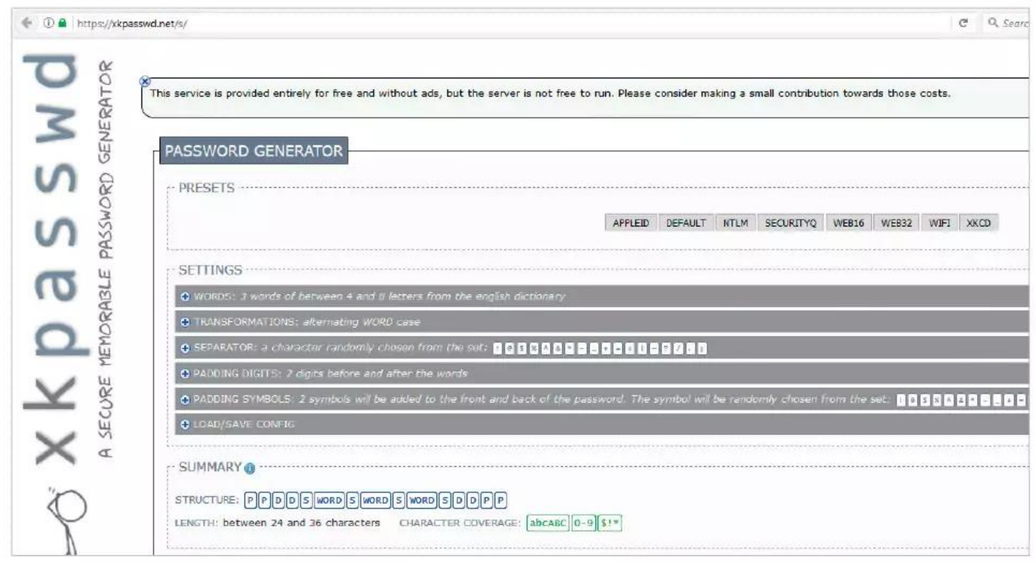
PASSEDS.NINJA

This is a quick and easy online password generator. You won't get any options or added extras, you simply click a button and ten unique passwords will be displayed for you to choose from. It's worth looking into for a quick solution to password creation; **https://passwds.ninja/**.



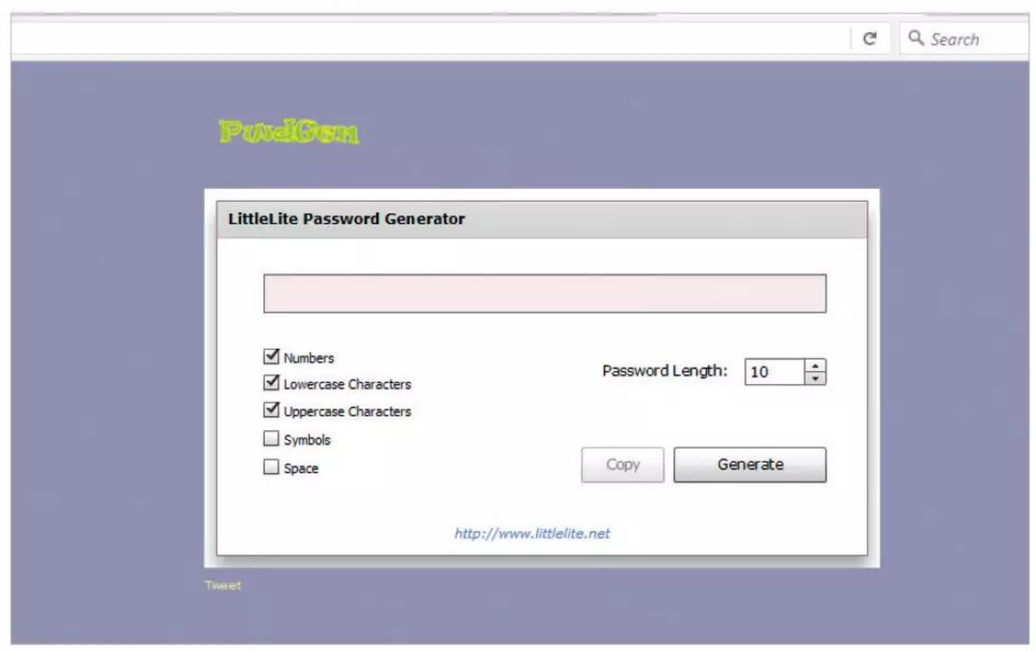
XKPASSWRD

This site is powered by the XKPasswd.pm Perl module, which offers a range of settings to help create a unique and very strong password. There are plenty of options to choose from and you can save and load your preferred configuration for later. It's at: **https://xkpasswd.net/s/** if you want to check it out.



LITTLELITE PASSWORD GENERATOR

Another simple but easy to use and good online password generator. LittleLite offers some options, including password length, number, upper and lower case, symbols and spaces. It's found at **http://www.littlelite.net/pwdgen/** and certainly worth considering bookmarking.



DINOPASS

For kids at school or when online, DinoPass is an excellent resource that will help them come up with a memorable, yet strong password. You can choose between a simple or strong password type, depending on where it's going to be used and there's meanings of each to help out, too. You can find it at: **http://www.dinopass.com/**.

Top Ten Password Managers

Creating uncrackable passwords is one thing, remembering them for each of the services that require one is something else entirely. The reason why most people opt for a single password for all their accounts is simply due to not being able to remember them all. This is where password managers help.

Manage Those Passwords

Password managers differ in what they offer, how they work and what optional extras they provide. Therefore it can be tricky to find one that fits the bill. Some are free, others cost a monthly or annual fee; here are ten to consider.

LASTPASS

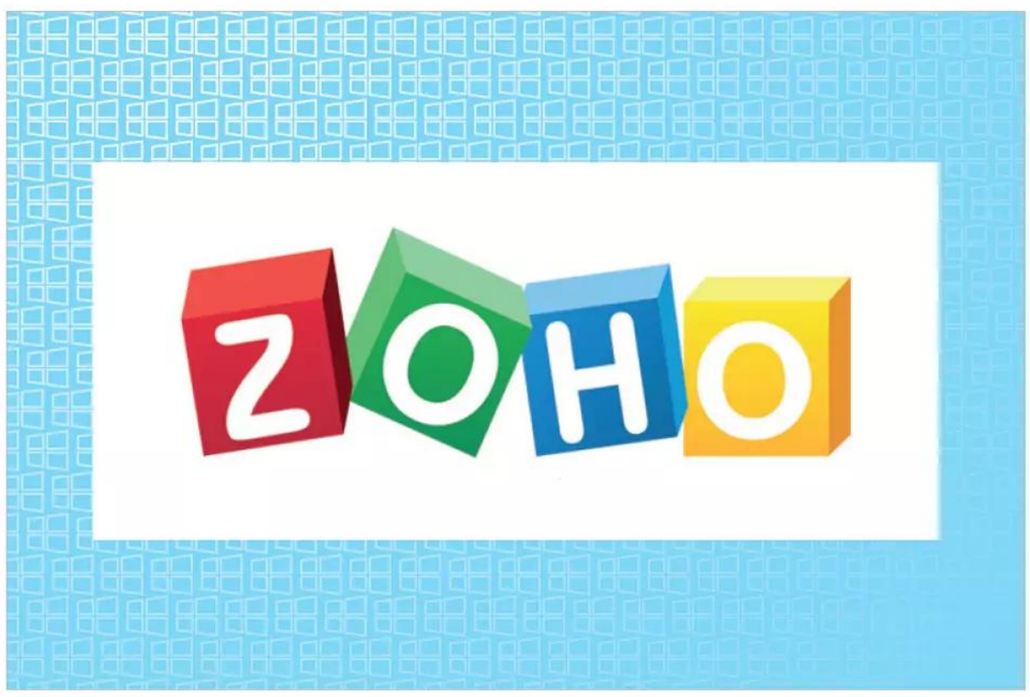
LastPass, which also offer a free password generator, is regarded as one of the finest managers available. There's a free version that offers unlimited password storage, cross-platform access, two-factor authentication and elevated levels of encryption. There's also a Premium version that offers a lot more, including 1GB of encrypted file storage and higher levels of encryption.

STICKY PASSWORD

Sticky Password is available both as free or Premium versions, costing just £24 and offers two-factor authentication, autofill for websites, advanced biometrics; it's also available on all major platforms. The Premium version goes further with cloud backup and syncing and with every license purchased a Manatee is saved. Certainly worth considering.

ZOHO VAULT

Zoho Vault is another excellent password management application. With a free version on offer, moving up to Enterprise levels for just €7 per month, Zoho allows unlimited passwords, access from all platforms, password tracking, offline access, auto-login for websites and much more.

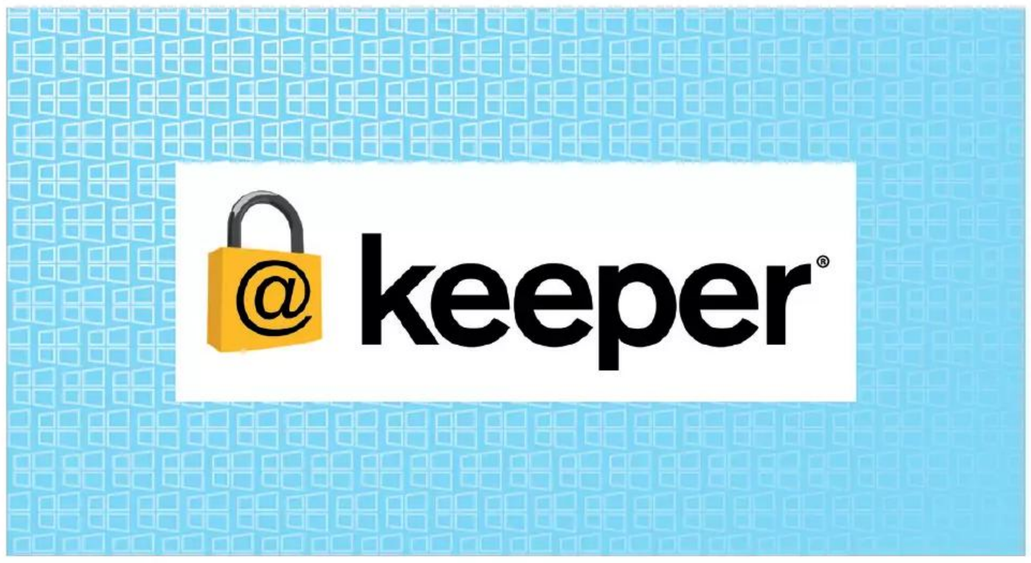


DASHLANE

With free, Premium and Business options available, Dashlane covers a huge user base. Its features are many and it offers the user a high degree of encryption and security alongside all the usual auto-filling, two-factor authentication and the ability to export data.

KEEPER

Keeper is a powerful and feature rich password manager that has Individual, Family and Business plans available for £20.99, £44.99, and £22 per year respectively. With unlimited password storage, unlimited device syncing, finger print login and secure cloud backup, amongst others, it's certainly one to consider.

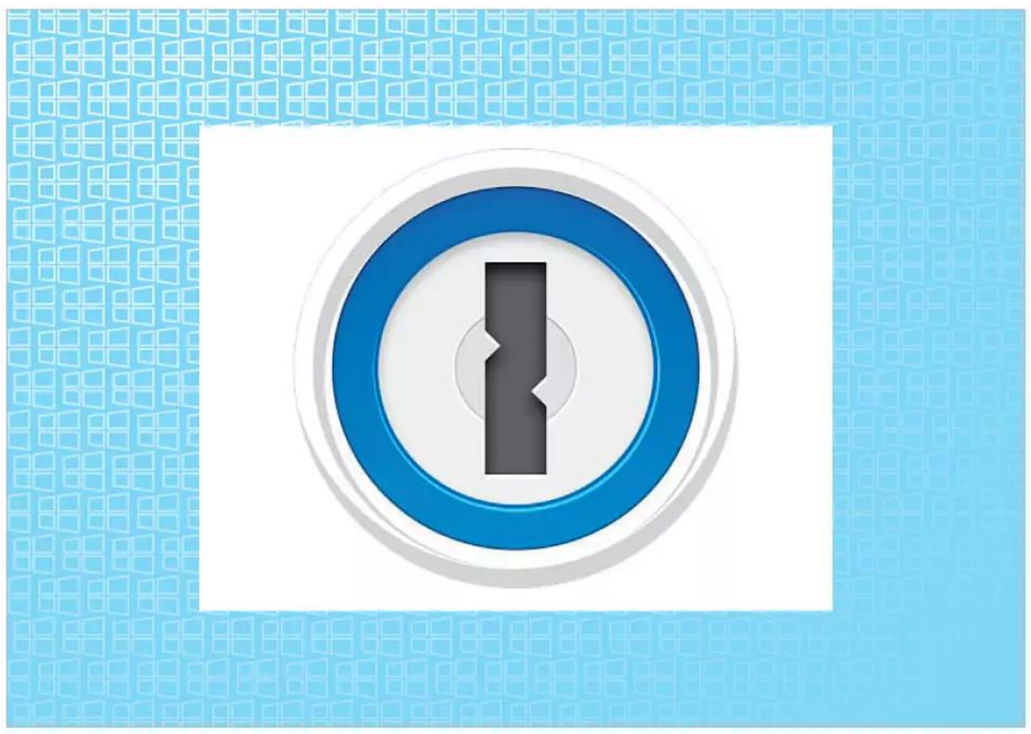


KEEPASS

KeePass is a freely available, open source password manager that's regularly updated and comes with a long list of interesting features. You can import and export password data, it's fully portable so there's no installation required and it adheres to 256-bit AES encryption.

1PASSWORD

1Password offer an individual and Family plan for as little as £2.30 and £4 per year. With it you can access password across all your devices and operating systems; there's offline access, automatic synching, 1GB of secure storage available and a 365 day password history recovery.



PASSWORD BOSS

Password Boss offers both free and Premium plans, with the Premium plan costing around £24 per year. There are ample features to enjoy, including cross platform support, full military encryption, cloud synching and more.

TRUE KEY

True Key is an excellent password manager with a free and Premium plan available; the Premium plan costing around £29.99 a year. It's unique in that it utilises facial recognition as well as finger print, and integration with Windows Hello. There are plenty of other options available too, so it's worth looking into.

LOGMEONCE

LogMeOnce is an award-winning password manager that incorporates many interesting features. It's ultimate selling point, however, is a passwordless operation, whereby you are able to log in to any website or service just by using facial recognition. Prices do vary across the Premium, Professional and Ultimate editions but the personal version is free.

Shopping Online and Security

Windows is continually improving and as such the new updates have brought a more customisable degree of control over the operating system's privacy configuration; something that Microsoft has always been criticised for in the past.

The length of breadth of online shopping is far too vast to cover every conceivable angle here. So rather than

"10 Online Shopping Security Tips"

focus on particular elements, here are ten online shopping security tips to apply across the board.

RUSH BUYING

Don't be fooled into rush buying something that's at a ridiculously low price. If a site is selling an iPhone for £20, then it's more than likely to be a ruse to lure you in and steal your money.

FAKE SITES

Ensure that you're buying from a real website. Fake sites are remarkably easy to create by the clever hacker and are designed to steal your transactions. Be wary of sites other than the big names. While smaller online shops are fine, just look into the type of security it's using and do some research before purchasing.

BOGUS EMAIL

Strange email addresses are something to look out for with suspect online shops. If the support email or contact information for the site is something like: ebayhelp@gmail.com instead of support@ebay.com, then there's most definitely something wrong.

USE HTTPS

Remember to load up the online shop using HTTPS instead of HTTP. This will ensure that the transactions and data sent between you and it are encrypted to the highest possible levels. If possible, use a browser add-on such as HTTPS Everywhere.

STRONG PASSWORDS

Use a strong and unique password for all your shopping sites. Occasionally, although not often, websites can be hacked and the database of users is leaked. If your password is strong enough, it will stand up to any decryption methods.

AVOID PUBLIC Wi-Fi

Tempting as it may be, don't use a public Wi-Fi access point to conduct any online shopping. For one, you could be attached to an Evil Twin Wi-Fi point, where the hacker is filtering all information through their system and two, all your data can be intercepted and potentially read.

SHOPPING APPS

If possible, always use an online shop's dedicated app rather than the standard website. Websites can be compromised, however apps from iTunes and the Windows Store, for example, can't be altered by a third-party.

3RD PARTY SECURITY

Invest in one of the many third-party antivirus and malware suites, such as Bitdefender. These programs also offer extra security when shopping online and can help prevent any hacking or data interception from happening whilst the transactions are in progress. They can also check the site you're buying from, too.

PAYPAL

If possible use PayPal or a Credit Card as opposed to a Debit Card. Credit cards have an extra layer of protection and legal standing than that of a debit card; PayPal features many protection elements within its accounts too.

BANK TRANSACTIONS

Always keep an eye on your bank account and the transactions that go on after you've conducted online shopping. This will help you get an idea of what's going on and should something suddenly crop up that looks suspicious, then you're able to inform your bank before too much damage is done.

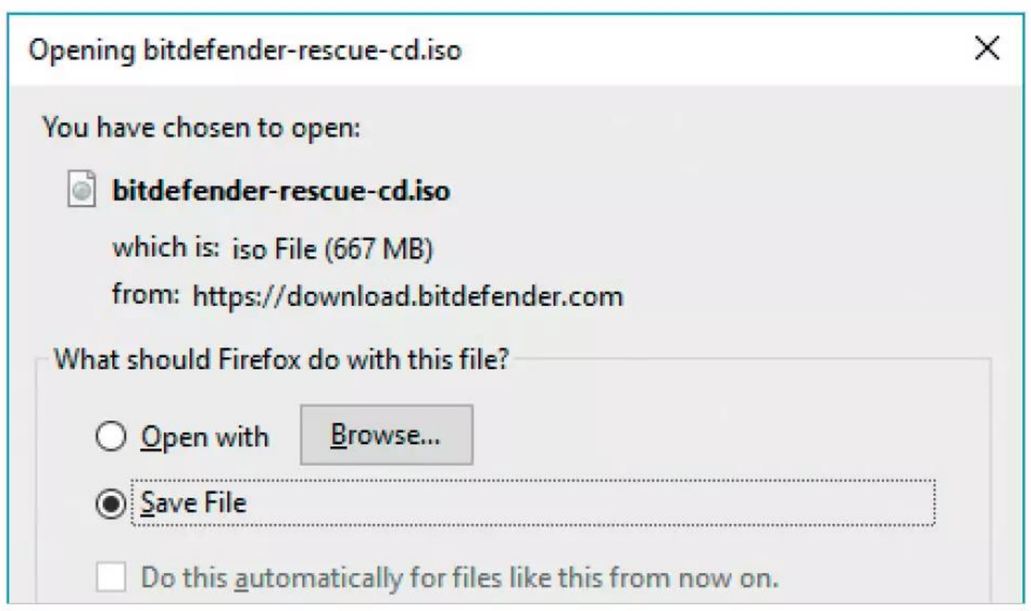
How to Remove a Virus or Malware from a PC

So far we've looked at ways to prevent getting scammed or indeed getting malware on your system but what if you're unlucky enough to already have some form of digital infection? Thankfully, there's a way to remove malware and viruses from your computer.

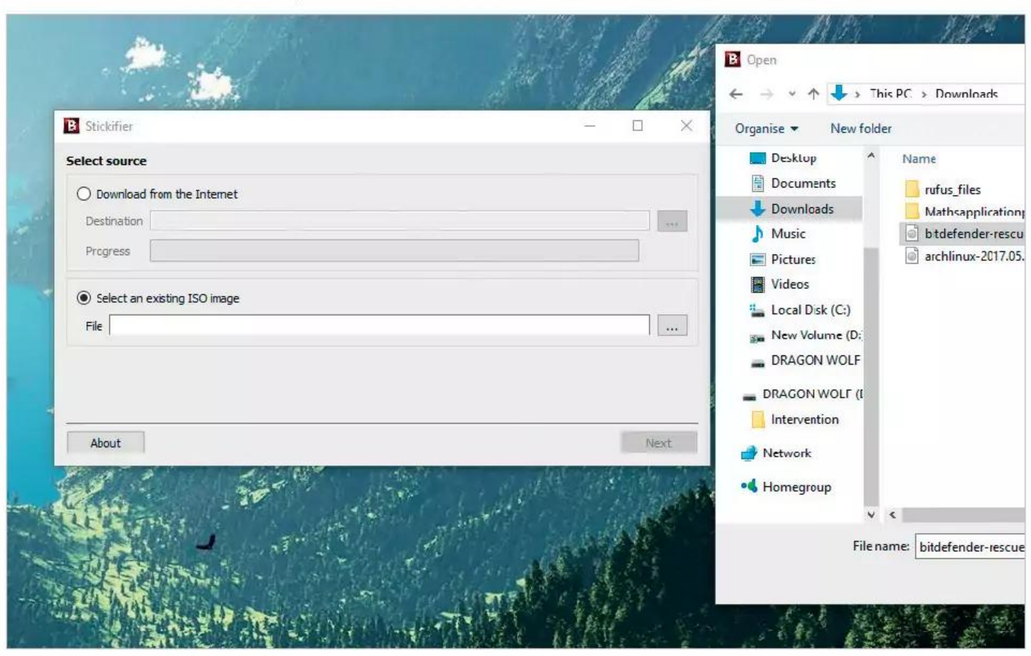
Malware Busters

For this tutorial let's use a preconfigured rescue disk from Bitdefender. You need to transfer, or burn, the disk contents to a CD or a USB stick and boot into the safe environment through one of those mediums.

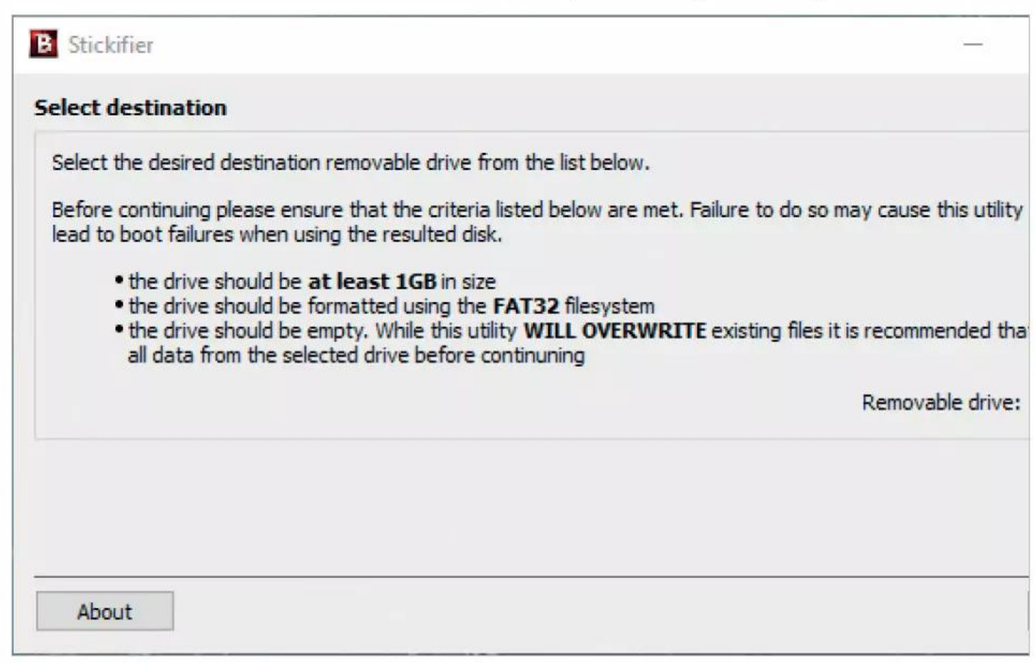
STEP 1 Make sure you have a blank CD or a USB stick that's at least 1GB in size. The Bitdefender Rescue Disk is downloaded as an ISO (which is an image file containing all the disk information) and can be downloaded from www.download.bitdefender.com/rescue_cd/latest/bitdefender-rescue-cd.iso.



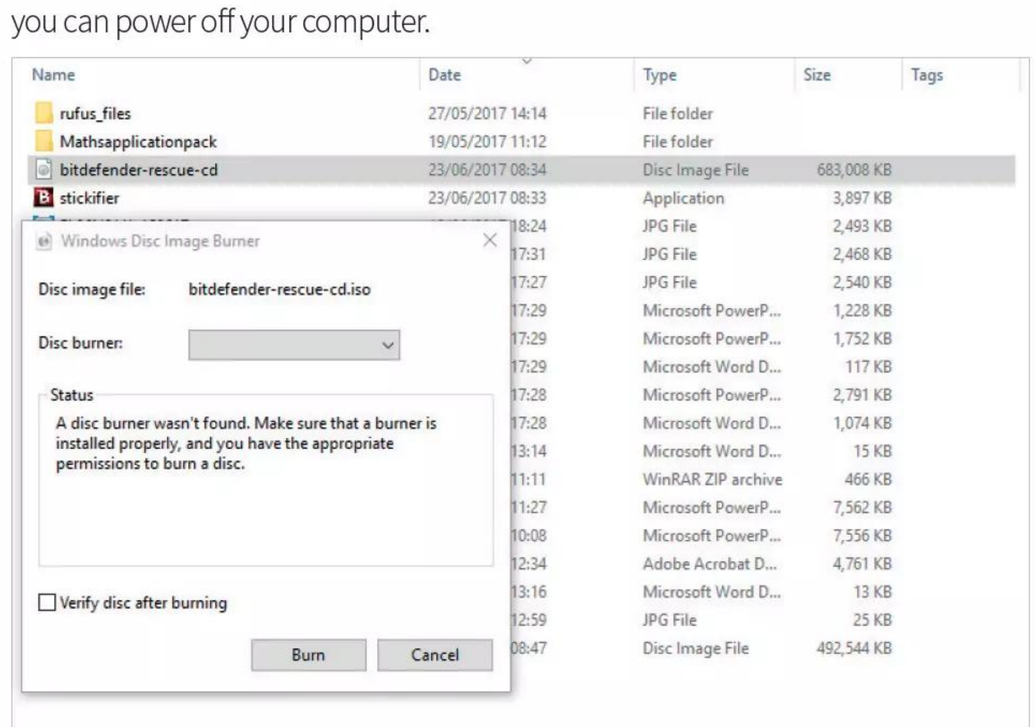
STEP 2 To transfer the ISO to USB download Stickifier, which is an executable that doesn't require any installation. Insert your USB stick and double-click Stickifier. Click the Select an Existing ISO Image option followed by the three full-stops and using Windows Explorer, locate the downloaded Bitdefender Rescue ISO. Click the Open button to select the image and continue with the process.



STEP 3 Click the Next button and using the drop-down menu next to Removeable Drive choose the drive letter of your USB stick. Click Next to start the transfer of the image. Once the image is transferred click the Finish button and remove the USB stick and power off your computer.



STEP 4 If you're using a CD, start by inserting the CD into the drive. Locate the downloaded Bitdefender Rescue ISO, right-click it and choose Burn Disc Image from the context menu. Tick the Verify disc after burning option and click the Burn button to start the process. Once the ISO is burnt to the disc, you can power off your computer.



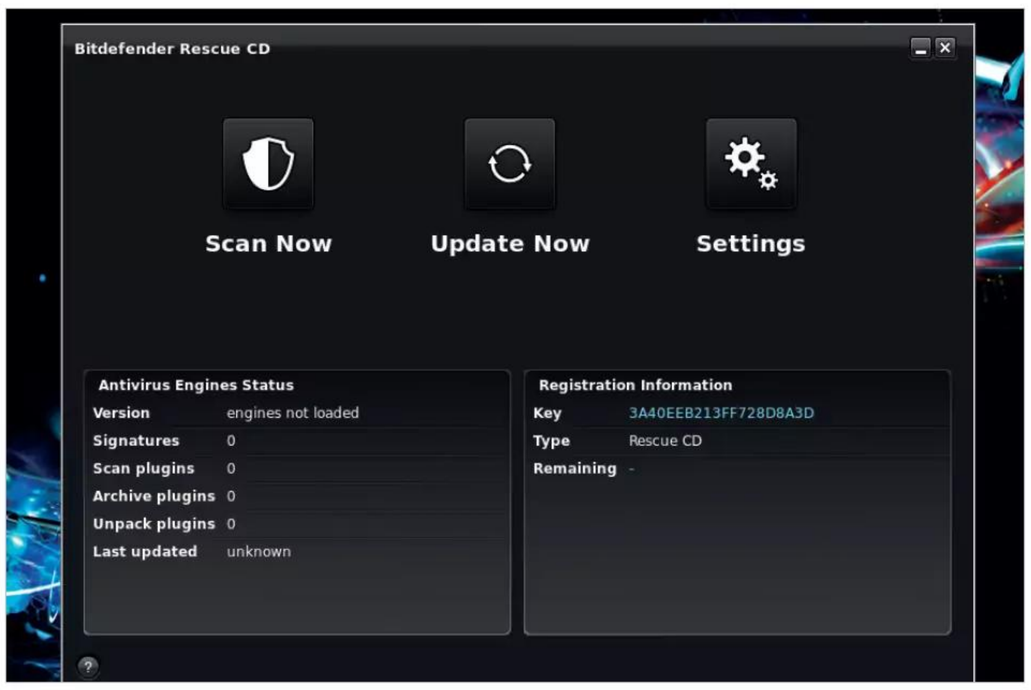
STEP 5 You now need to allow your PC to boot up into the Bitdefender Rescue CD environment. Power up your PC and open the Boot Option Menu. This could be accessed by pressing F12, depending on the make and manufacturer of your PC motherboard. With the boot options available, select either the CD or USB stick and press Enter.

STEP 6 The PC will now boot into the Bitdefender Rescue Disc environment. This is a custom Linux operating system with all the necessary Bitdefender security tools preinstalled. First, you need to choose which language to load the environment. Use the arrow keys, and press Enter for your language choice.

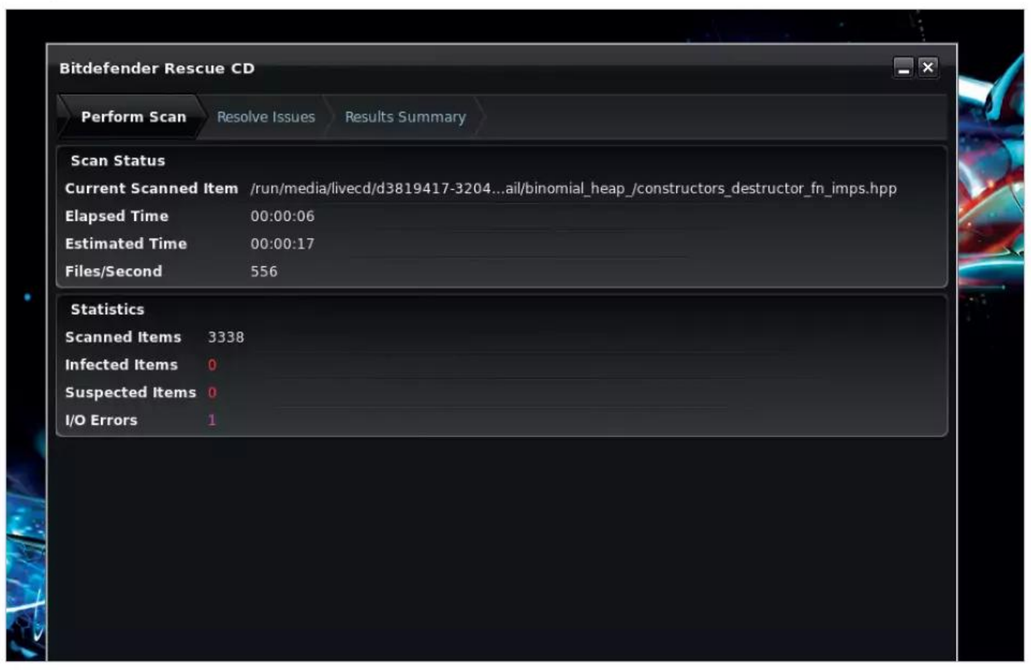
STEP 7 Ideally you should use a wired Internet connection but if you're on wireless, click on the network icon in the bottom right of the desktop to establish a connection with your router. Once you're connected to the Internet, double-click the red Bitdefender icon on the desktop, labelled Antivirus Scanner.

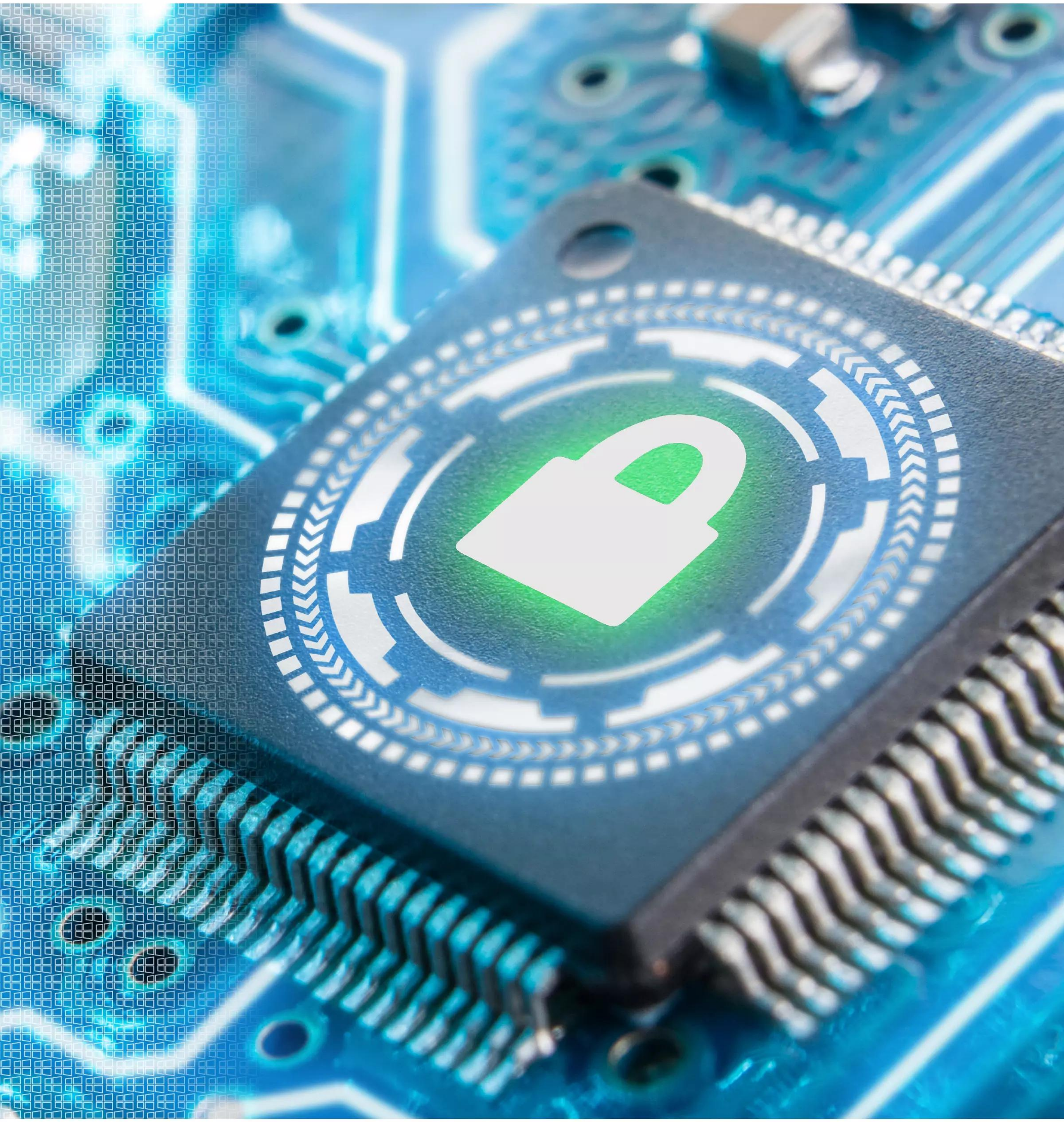
STEP 8 You need to accept the license agreement notification first. Tick the I agree box, followed by clicking the Continue button. The virus scanning software will then start to automatically update itself with the latest virus definitions from the Bitdefender servers. The process won't take too long, so let it run through the update.

STEP 9 Once the update is complete you're taken to the main Bitdefender Rescue CD antivirus interface. The three main options: Scan Now, Update Now and Settings are fairly self-explanatory; the Settings allows you to set a few more options regarding the scan, however the defaults will suffice.



STEP 10 To remove a virus on your PC, click on the Scan Now button. Select the drive you wish to scan and click the Open button to commence scanning the system. Any viruses found will be detailed along with options for removal. The process may take some time, so be prepared for a lengthy wait.





Advanced Security Tips

If you want to improve your Windows security further, then this section looks at more advanced ways and means in which you can achieve that goal. We cover firewalls, sandboxing and virtual environments and how to tell which programs are communicating beyond your home network.

Our easy to follow tutorials will help you create a reliable backup of Windows and all your data, so should something happen you'll be able to restore your files with confidence.

90 Windows Privacy Settings
92 How to Check which Apps are Sending Information
94 What is a firewall?
96 Improving the Windows Firewall
98 Creating a Security Plan
100 Windows Security Checklist
102 What is a Sandbox?
104 Running Windows as a Sandbox
106 Installing VirtualBox
108 Installing Windows in VirtualBox
110 Creating VirtualBox Snapshots of Windows
112 Create a Windows Recovery Drive
114 How to Back Up Windows
116 How to Create a Windows System Image
118 Extreme Windows Lockdown Tips
120 Cyber and Windows Quiz
122 What the Experts Say

Windows Privacy Settings

Windows's new updates and special edition updates have brought a more customisable degree of control over the operating system's privacy configuration; something that Microsoft has always been criticised for in the past.

Windows is said to be the last true Windows desktop release, with the Redmond company

> **Going Private**

now opting for a rolling release cycle, that will add or remove features over time through regular updates.

There are many advantages to this particular setup. A Windows user will always be up to date with regards to security, options and support. Any new hardware that's released will be added to the vast driver database that Windows already uses and it will operate at its maximum potential. Microsoft can gradually roll out features that would require a brand new operating system, thus maximising the capabilities of the OS. Of course, the company can charge for certain additional features that would ordinarily be a part of the OS, such as a media centre for example.

However, profit margins aside, it's the rolling security and updates that the user will benefit greatly from. As Microsoft evolves Windows, user and developer feedback can help improve the way the OS protects its user base. A prime example is the new privacy settings available post-Fall Creators Update, which was gradually rolled out to Windows PCs around late October 2017. The privacy settings and options that are now on offer are a radical improvement over the previous, rather bleak, features that came with the original Windows setup. Now, the user has greater control over what the OS can and cannot do to affect an individual's privacy.

Providing you've applied the Fall Creators Update, you can view the current privacy options by clicking the Windows Start button and typing privacy into the search box. Click on the Privacy Settings option, with a padlock icon, and the core privacy options window will open. There are, at the time of writing, nineteen different options available to browse through. Each option, when clicked, will display a subset of available options that can then be enabled or disabled and turned on or off, depending on your preference.

For example the first option, General, offers the user a choice of opting for advertising via apps, allowing websites to provide locally relevant content based on the user's language list and allowing Windows to track how an app is launched to improve search results. Whilst that in itself doesn't sound too much like your privacy is being infiltrated, there are those who don't want the installed apps and the OS having too much knowledge of where they are and what to advertise. Like most privacy options, it's a personal preference as to what you're happy sharing with the system and its connected technologies. Whilst opting to turn every privacy setting on will inevitably open your use of Windows up to whoever or whatever is readily receiving the information, likewise turning everything off will effectively hide you (to some degree); but at the cost of possible loss of available features. There's a fine balance needed to get the best from your privacy and still enjoying Windows's many features.

There are some interesting additions to the Fall Creators Update privacy settings, which are certainly worth looking over, if you want a best of both worlds approach to privacy and features.

Location – The Location option will allow Windows and its apps to use your current location to specialise any content. It's innocent enough but for added privacy it's worth considering turning it off.

Camera – This is an excellent addition that will define which installed apps have access to the computer's webcam. You can turn off app access to the camera globally or browse through the apps to decide which has access, or not.

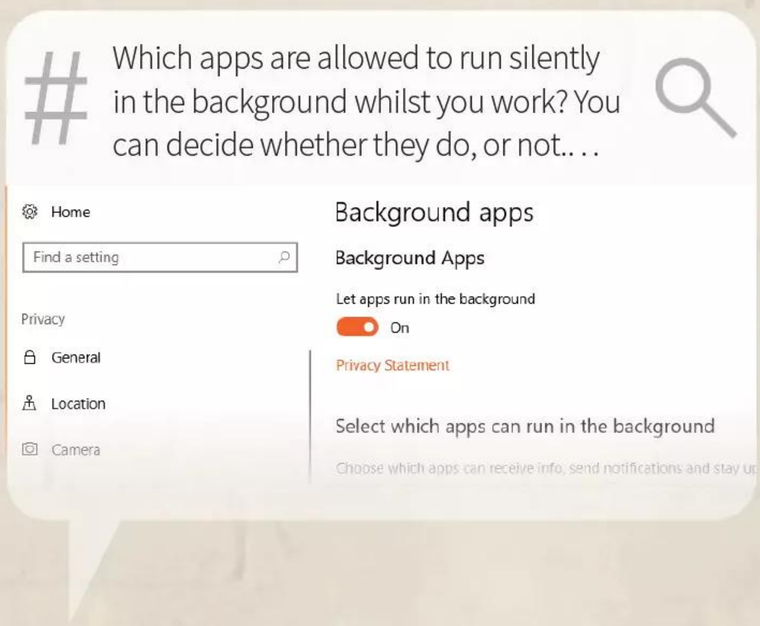
Microphone – The same applies for the computer's microphone; which apps can access it or not, and whether you want to globally turn it off.

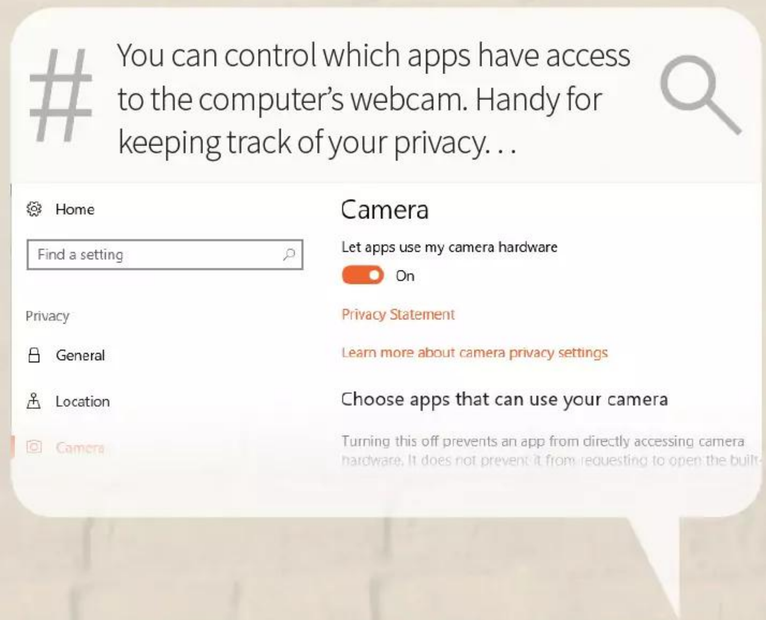
Contacts – The Contacts section details which apps can have access to your current Windows account contacts. Disabling this globally may have a severe impact on how some apps, such as Skype and email work.

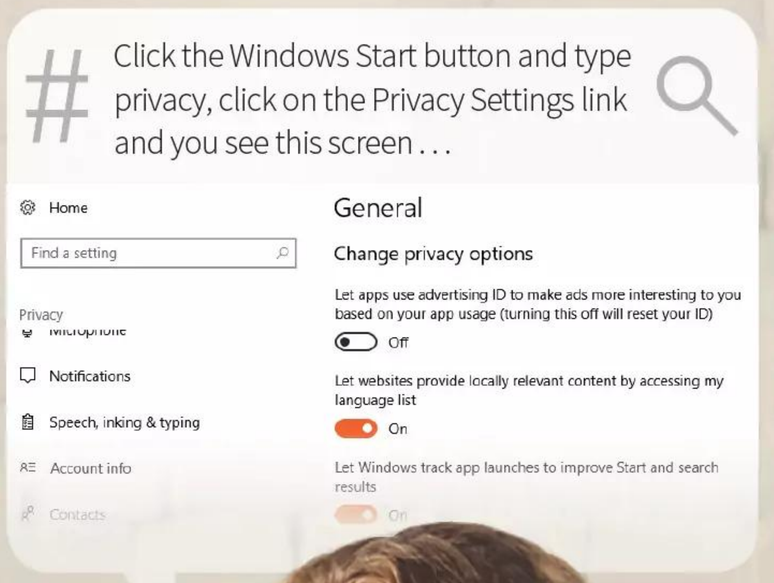
Radios – This option will define which apps can control hardware such as the computer's Bluetooth device, Wi-Fi or any other kind of wireless receiver. Obviously, some apps will require access to share information or allow access to shared areas.

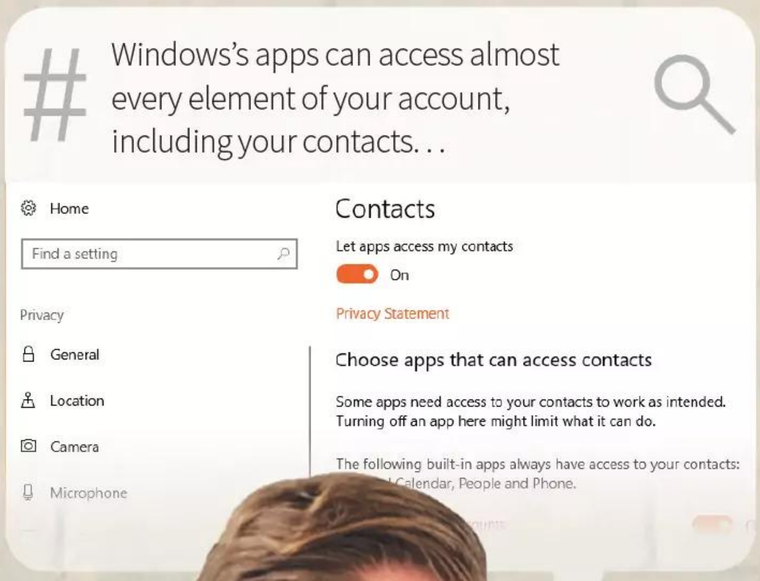
Background Apps – Windows's background task handling is far better than in previous versions of the operating system. Memory is released as apps drop into the background, as is processor allocation. However, you can further define which apps will be allowed to run in the background with this option.

Taking time to go through each of the available options is something every Windows user should do. This way you become familiar with how the OS shares your account data and what exactly has access to your Windows computer and its hardware.









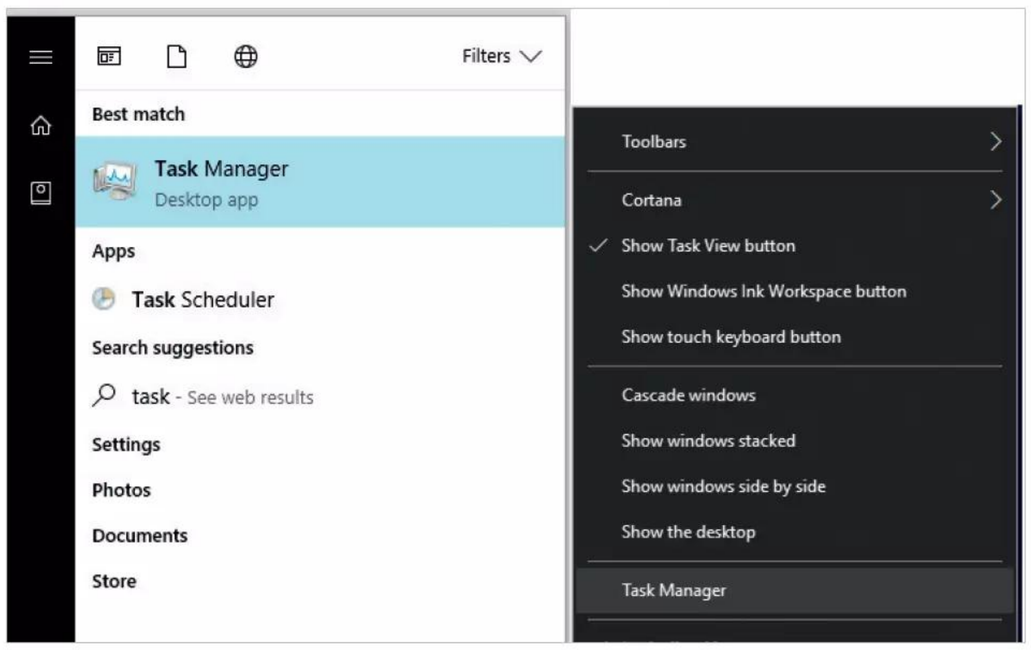
How to Check which Apps are Sending Information

Most Windows apps and programs have some element of code that will attempt to communicate with an external source. That communication could be to check for the latest version, or patches and updates, or it could be malicious software sending personal data.

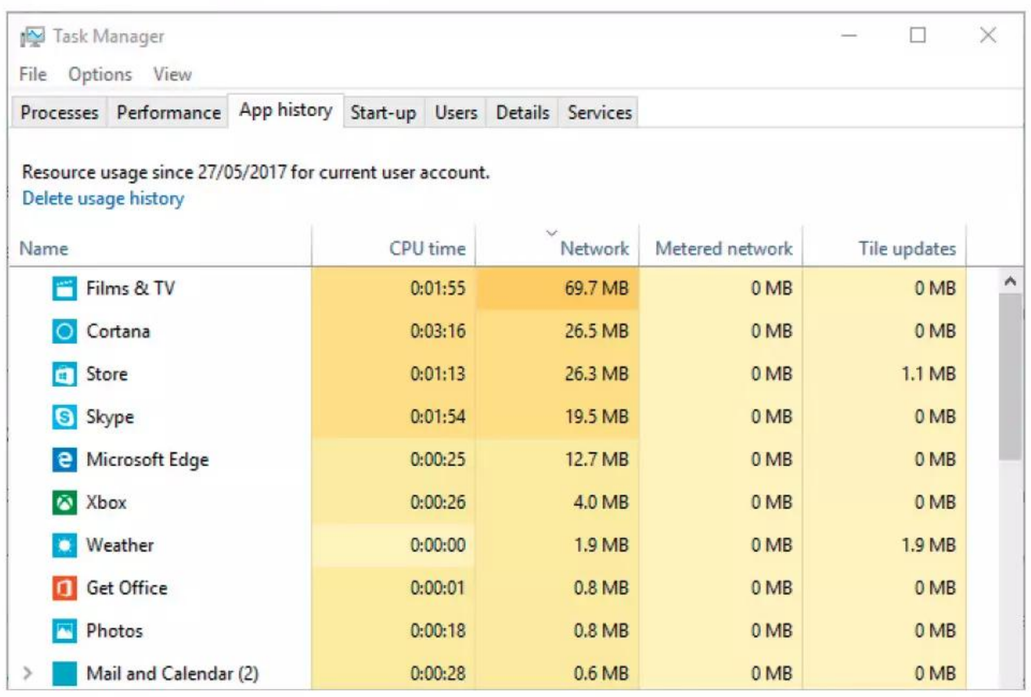
Look Who's Talking

There are a number of ways in which you're able to view which programs and apps are sending data to Internet and external sources. Some methods are better than others, so it's worth trying them all to see which works best for you.

STEP 1 The first port of call to help monitor what apps are accessing the Internet is Task Manager. Click the Windows Start button and type task, then click the Task Manager result in the search box. You can also right-click the taskbar and select Task Manager from the available option in the menu.



STEP 2 With Task Manager displayed, click the More Details arrow (if it's available). This will expand the Task Manager options. From here, click the App History tab and then the Network column so that there's a downward pointing arrow above it. This indicates network use in a descending order of amount of data sent.

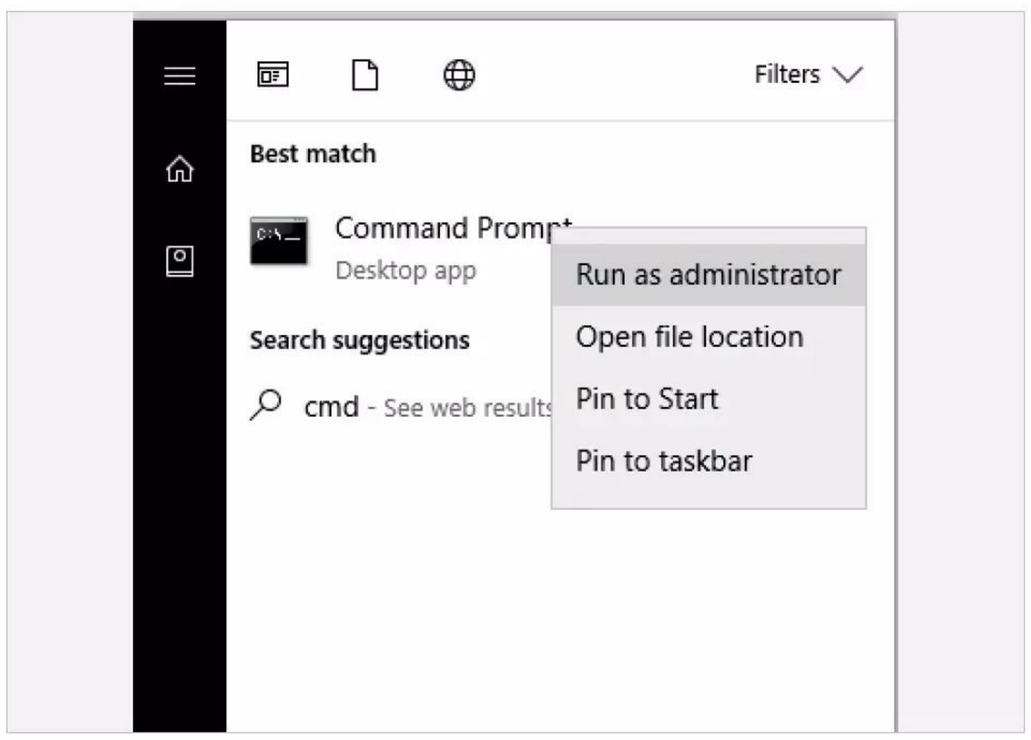


Name	CPU time	Network	Metered network	Tile updates
Films & TV	0:01:55	69.7 MB	0 MB	0 MB
Cortana	0:03:16	26.5 MB	0 MB	0 MB
Store	0:01:13	26.3 MB	0 MB	1.1 MB
Skype	0:01:54	19.5 MB	0 MB	0 MB
Microsoft Edge	0:00:25	12.7 MB	0 MB	0 MB
Xbox	0:00:26	4.0 MB	0 MB	0 MB
Weather	0:00:00	1.9 MB	0 MB	1.9 MB
Get Office	0:00:01	0.8 MB	0 MB	0 MB
Photos	0:00:18	0.8 MB	0 MB	0 MB
Mail and Calendar (2)	0:00:28	0.6 MB	0 MB	0 MB

STEP 3 This is a reasonably accurate way of viewing which installed programs have been accessing the outside world. The amount of data being sent to and from your PC can be quite illuminating, and surprising, as you may never even realise you have a particular app installed never mind that it's communicating with an external source.

Films & TV	0:01:55	69.7 MB	0 MB	0 MB
Cortana	0:03:16	26.5 MB	0 MB	0 MB
Store	0:01:13	26.3 MB	0 MB	1.1 MB
Skype	0:01:54	19.5 MB	0 MB	0 MB
Microsoft Edge	0:00:25	12.7 MB	0 MB	0 MB
Xbox	0:00:26	4.0 MB	0 MB	0 MB
Weather	0:00:00	1.9 MB	0 MB	1.9 MB
Get Office	0:00:01	0.8 MB	0 MB	0 MB
Photos	0:00:18	0.8 MB	0 MB	0 MB
Mail and Calendar (2)	0:00:28	0.6 MB	0 MB	0 MB
Sport	0:00:01	0.5 MB	0 MB	0.5 MB
OneNote	0:00:01	0.1 MB	0 MB	0 MB
Twitter	0:00:01	0.1 MB	0 MB	0 MB

STEP 4 Another excellent method is by using the Netstat command. Click on the Windows Start button and enter **cmd**, then right-click the Command Prompt option and choose Run as Administrator from the menu. When the message to authenticate the action pops up, click on Yes.



STEP 5 With the command prompt open enter the following: **netstat -e -s -p tcp -b**. The information populates the command prompt box quickly, so you need to scroll back up to the top to see it in its entirety.

```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.15063]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>netstat -e -s -p tcp -b
Interface Statistics

                           Received            Sent

Bytes                     596867720        65196200
Unicast packets              515780          349675
Non-unicast packets           16485            6265
Discards                          0               0
Errors                            0               0
Unknown protocols                 0

TCP Statistics for IPv4

  Active Opens                        = 5067
  Passive Opens                       = 405
  Failed Connection Attempts          = 121
  Reset Connections                   = 763
  Current Connections                 = 16
  Segments Received                   = 712631
  Segments Sent                       = 572026
  Segments Retransmitted              = 7899
```

STEP 6 What you're looking at here is a list of programs, from the column to the far left, with the IP address of its source and the destination address in the middle column; with a third column detailing if the connection is established or not. It can be confusing to view at first but after a moment or two it should begin to make sense.

```
Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    127.0.0.1:55247        Windows:65001          ESTABLISHED
 [nvcontainer.exe]
  TCP    127.0.0.1:55366        Windows:55387          ESTABLISHED
 [NVIDIA Web Helper.exe]
  TCP    127.0.0.1:55387        Windows:55366          ESTABLISHED
 [NVIDIA Share.exe]
  TCP    127.0.0.1:55407        Windows:55408          ESTABLISHED
 [thunderbird.exe]
  TCP    127.0.0.1:55408        Windows:55407          ESTABLISHED
 [thunderbird.exe]
  TCP    127.0.0.1:55414        Windows:55415          ESTABLISHED
 [firefox.exe]
  TCP    127.0.0.1:55415        Windows:55414          ESTABLISHED
 [firefox.exe]
  TCP    127.0.0.1:55416        Windows:55417          ESTABLISHED
 [firefox.exe]
  TCP    127.0.0.1:55417        Windows:55416          ESTABLISHED
 [firefox.exe]
  TCP    127.0.0.1:65001        Windows:55247          ESTABLISHED
 [nvcontainer.exe]
  TCP    192.168.1.180:55255    db5sch101101426:https  ESTABLISHED
```

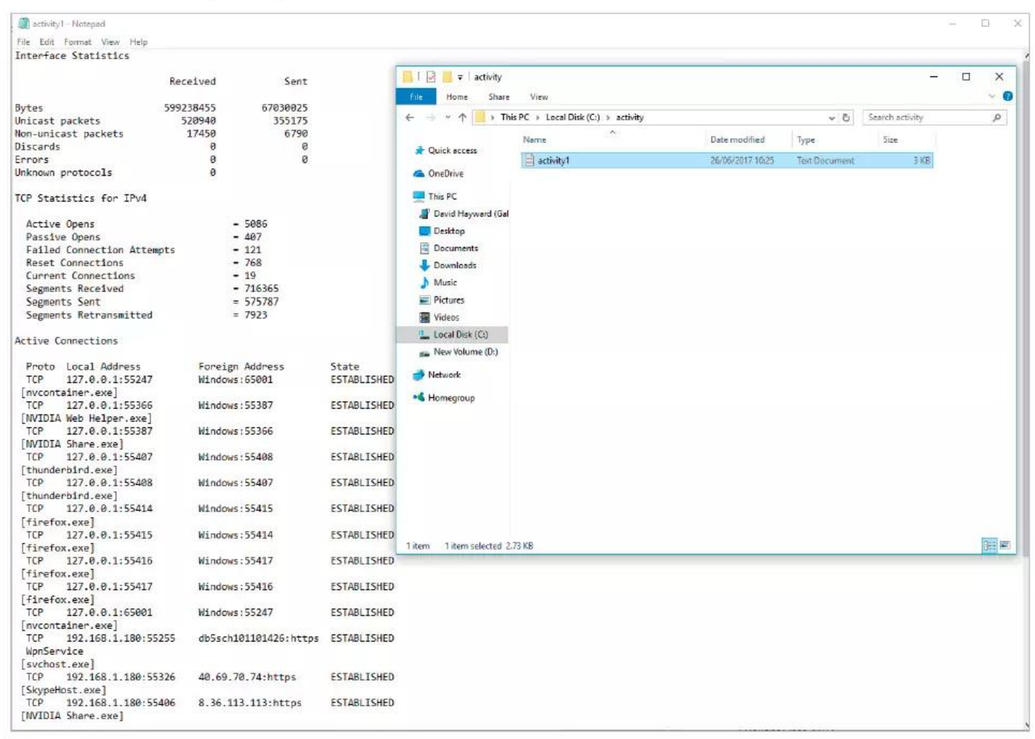
STEP 7 If you want to create a friendlier way of viewing Netstat active connection data, you can pipe the contents to a text file. For example, in the command prompt enter **cd** to take you to the root of the C: drive. Then create a new folder to store the text file with **md activity**, and enter it with **cd activity**.

```
Administrator: Command Prompt

C:\Windows\System32>cd\

C:\>md activity

C:\>cd activity

C:\activity>
```

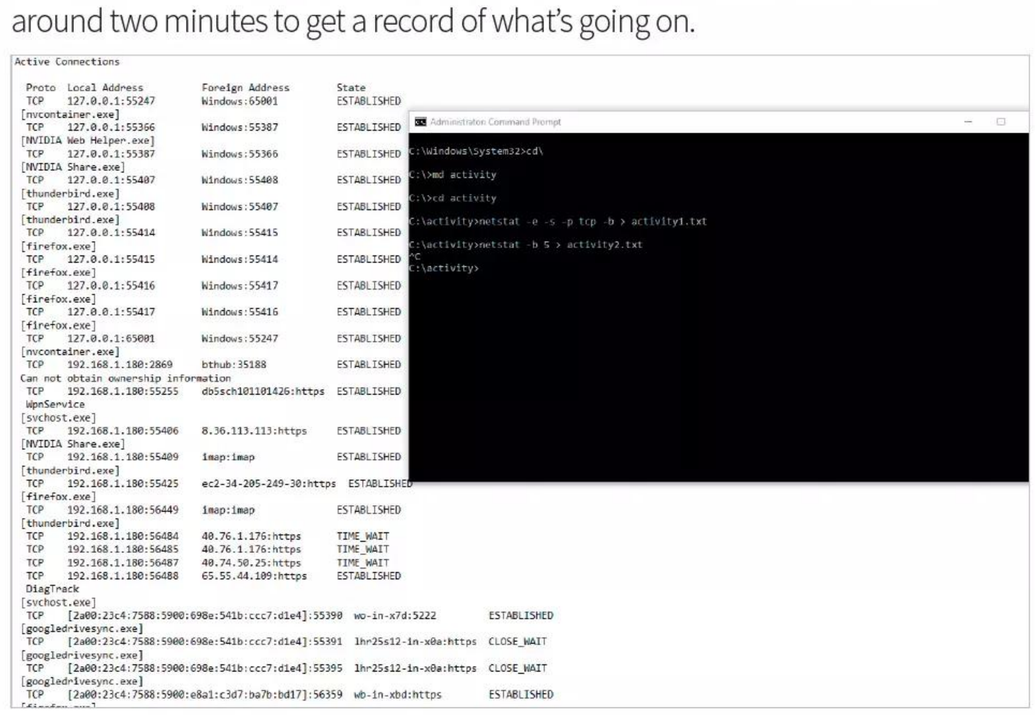
STEP 8 In the activity folder, enter the following: **netstat -e -s -p tcp -b > activity1.txt**. This is the same command as before but this time the output is being sent to a text file, named activity1.txt, rather than outputting to the command prompt window.

```
Administrator: Command Prompt

C:\Windows\System32>cd\

C:\>md activity

C:\>cd activity

C:\activity>netstat -e -s -p tcp -b > activity1.txt

C:\activity>
```

STEP 9 Using Windows Explorer, locate the C:\activity folder you created and within the activity1.txt file. Double-click the **activity1.txt** file and it opens in Notepad where you're able to view it without the often difficult to read command prompt window.



STEP 10 If you want to simplify the information and the process, enter: **netstat -b 5 > activity2.txt** into the command prompt within the activity folder on the C: drive. This will record the information and only write the data once you've pressed **Ctrl+C**, which stops the process. Use this for around two minutes to get a record of what's going on.



What is a Firewall?

The data packets that come and go between your PC and the outside world can be defined by a set of rules. These rules state whether a packet has access to the system in the first place, then whether or not it can gain access to its destination program. Collectively, these rules make up a Firewall.

Great Walls of Fire

The term firewall comes from fire prevention, where a physical wall is constructed in order to halt the spread of a fire. In digital terms, the physical wall stops malware and other threats from spreading into the system.

Some form of digital protection against unwanted entry into a system has existed for many years but the more recent software side of a firewall, one that we're reasonably familiar with, has only been around since the '80s.

Prior to the modern firewall, system administrators blocked unwanted access through various stages of hardware layers. Long lists of allowed computer addresses were painstakingly entered into mainframes and routers, where programmable chips filtered the white list and simply stopped all access to addresses that weren't on the list; think of a nightclub bouncer, if your name's not on the list you're not getting in.

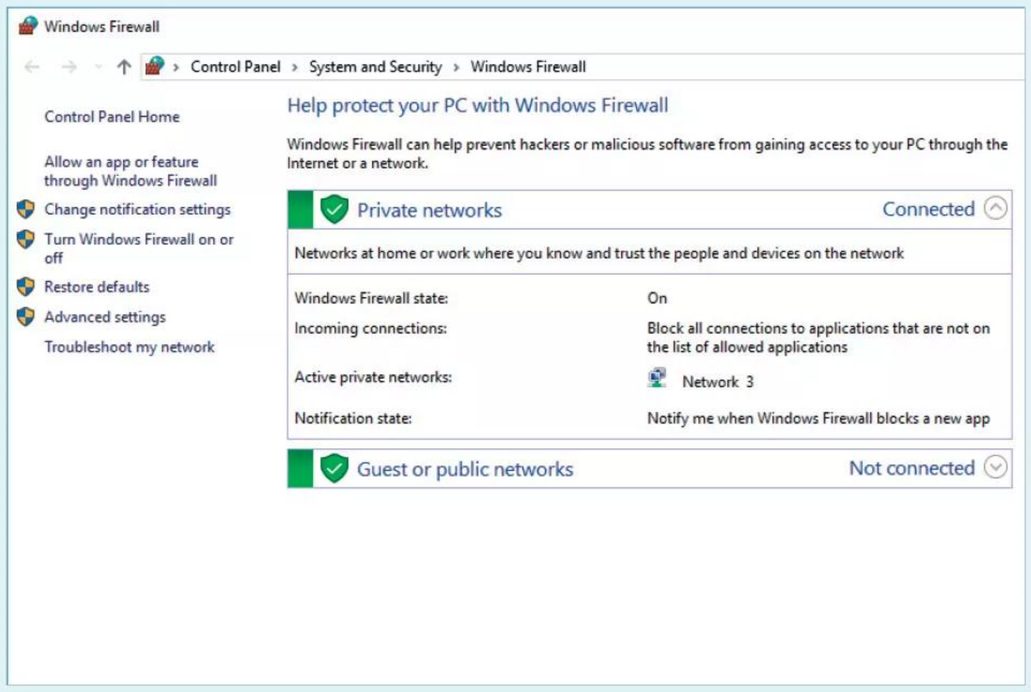
In its simplest guise, a firewall will look to a defined set of rules then apply those rules to any data packets that pass through it. For example, if you've created a rule whereby all Telnet traffic is blocked, any packet that's trying to reach port 23, the port that Telnet applications listen on for data, will be blocked. While suitably effective this low-level packet filtering does have its Achilles heel, in that it treats each packet as an independent piece of data: not knowing whether it's a part of an already established stream of data. This can be targeted by hackers who want access to a system with a firewall in place. The clever hacker is able to spoof a packet and thus tricking the firewall into letting it pass. It takes some time, and it's a bit hit and miss, but most hackers have plenty of patience when it comes to getting into a network. Therefore a much needed higher degree of firewall monitoring is called for.

Stateful Inspection firewalls were introduced in the mid '90s and enabled a firewall to log all the connection that passed through it determining what was the start of a new packet stream, part of an existing packet stream or something random. This allows a firewall to allow or drop any access based on a data packet's history. In terms of effectiveness, this makes the firewall more efficient and faster at dealing with connection requests as it doesn't need to continually analyse each packet as an individual but rather as a whole stream. For added layers of protection, if a packet doesn't match any of the connection histories, then it can be evaluated and filtered through the various rules to determine its legitimacy.

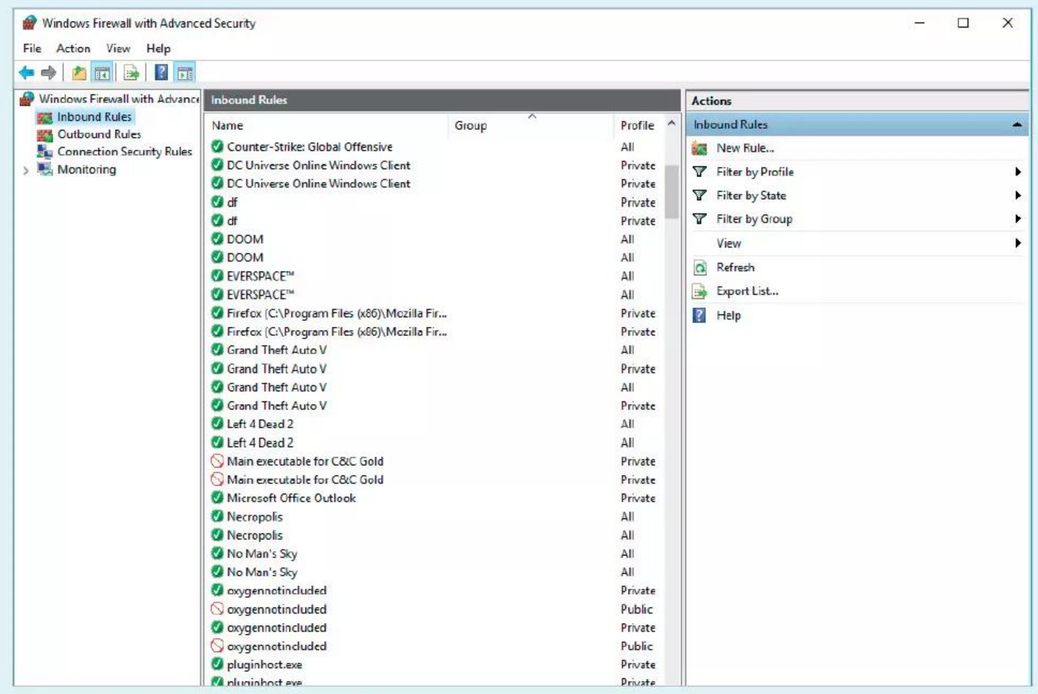
A further layer of protection was included into the basic firewall early in the 2000s. Application-layer analysis enabled firewalls to inspect packets that were targeting individual applications within the operating system. Each program or application installed in the system will use a set of protocols to communicate with the outside world. When an application is installed, on a Windows system for example, the installation mechanism will automatically add an instance of it to the Windows firewall. This means that it is able to send and receive information successfully through the Windows firewall without any of it being blocked. By blocking an application's access to the outside world, the user could miss out on regular updates, fixes, patches and so on. One of the key benefits to an application-layer firewall is that it's excellent at blocking specific content, such as known malware and viruses or dangerous websites. It's also capable of determining when a particular protocol is being misused by a rogue application.

Where the firewall proceeds from this point is unclear. However many experts agree that although we'll always need a firewall, the modern systems, networks and devices have so many potential access points that it's fast becoming less efficient to run the standard firewall model. In effect, the modern firewall, regardless of how complex and efficient it has become over the years, is quick becoming a bottle-neck for the operating system. What some experts are theorising is that at some point in the future, the need for a single, overall firewall will be outdated and that the next-generation operating systems will require each program and application that can be installed to act as its own firewall. Whether this will come about is pure fantasy at the moment but at the speed digital technologies grow and evolve there's a good chance of finding out soon enough.

> *Hardware firewalls are an early example of network security*



"The built-in Windows firewall is certainly good enough for most users' needs. It's fast, effective and can be easily configured."



"When each program, application, game and so on is installed, it is entered into the Windows firewall so it can communicate with the outside world."

"There are countless freely available third-party firewall clients. Some are very good, others not so much."

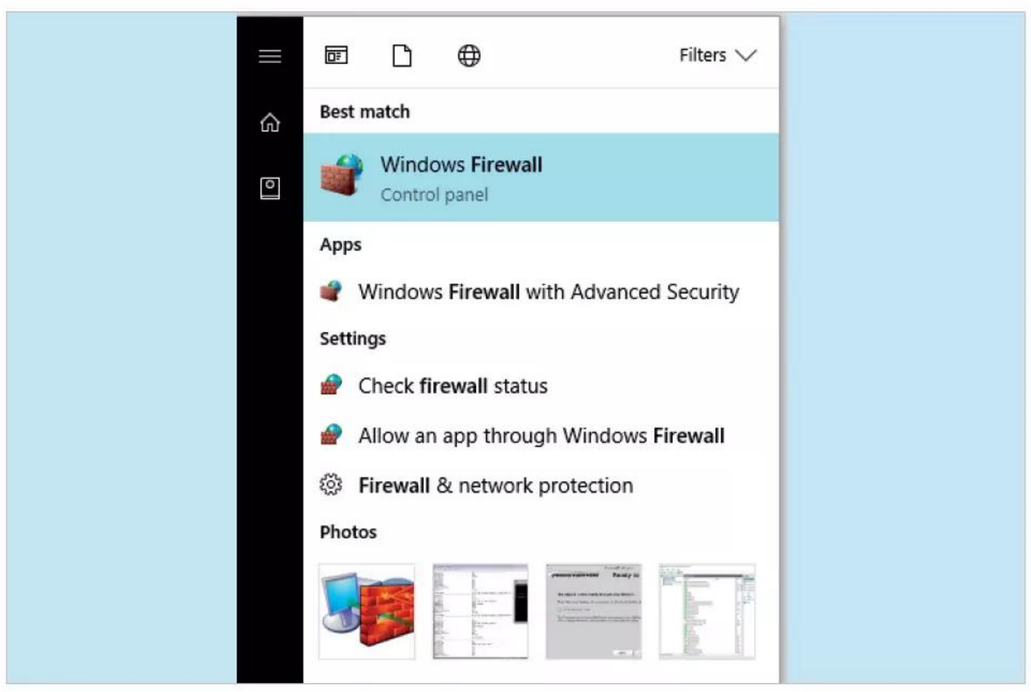
Improving the Windows Firewall

The built-in Windows firewall is a surprisingly good security application. Whilst it may not be as efficient as something offered by one of the third-party security suites, it's certainly more than adequate for the average user.

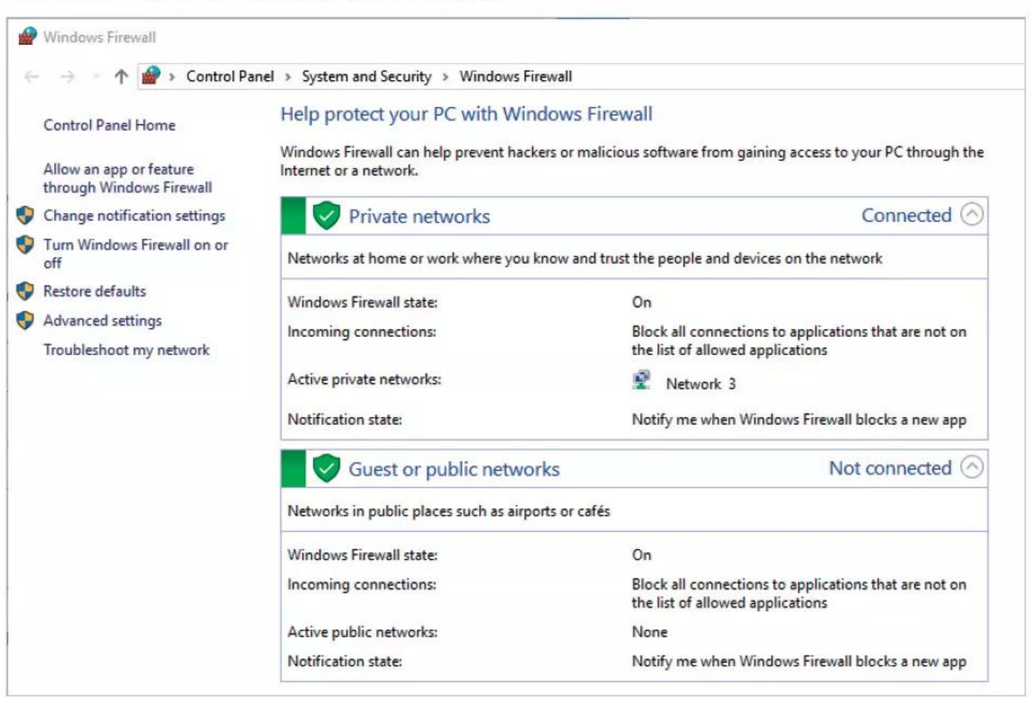
Getting to Know Your Firewall

Generally, there's little need to ever configure the Windows firewall. However, getting to know how it works and improving it is part of being more security-conscious. Here's some tips on how to manage it better.

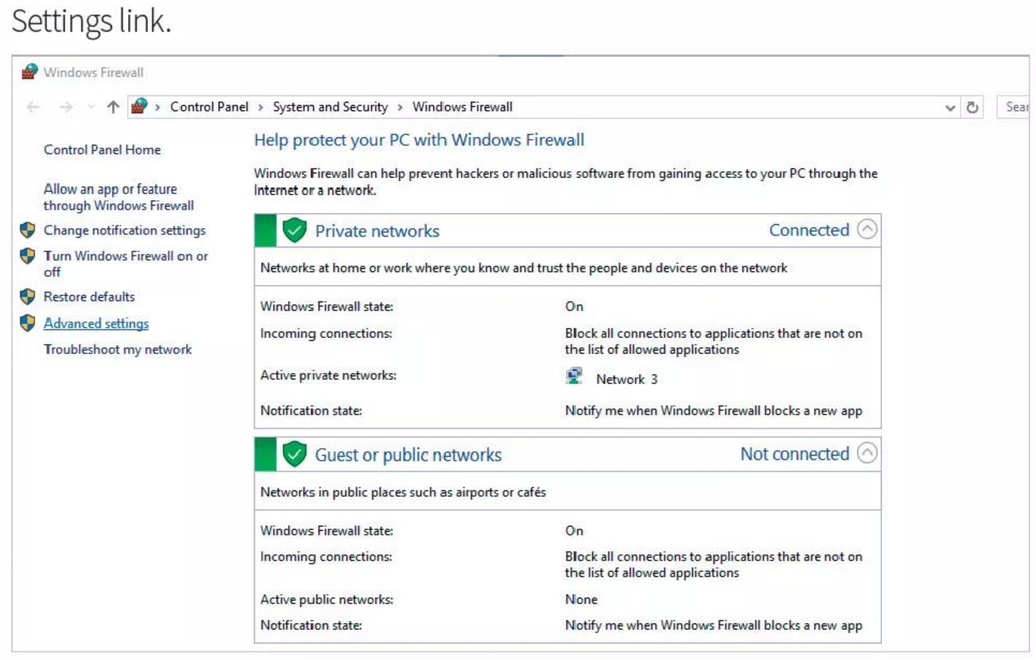
STEP 1 You can open the main Windows firewall console window by clicking on the Windows Start button and entering firewall into the search box. Click the returned link, Windows Firewall Control Panel, to launch it.



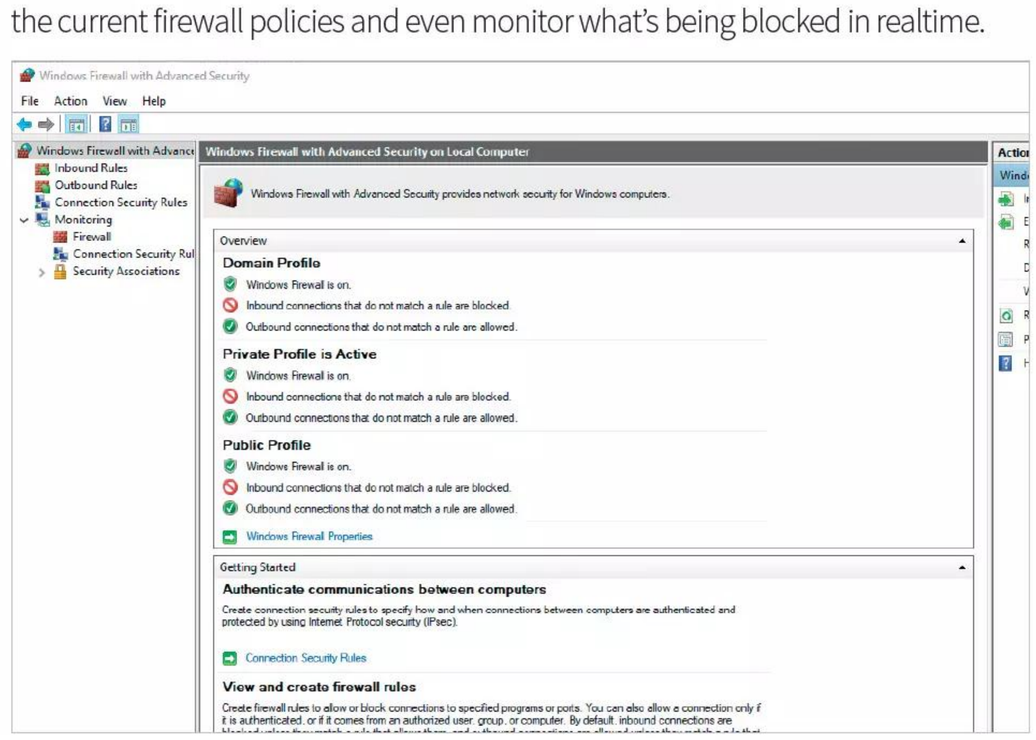
STEP 2 The Windows firewall console window starts by detailing the basic status of the firewall. It should be On by default, unless you've installed a third-party security suite which contains its own firewall. There are two kinds of network listed, Private and Public. Private is for home or work, whereas Public is for cafés and the like.



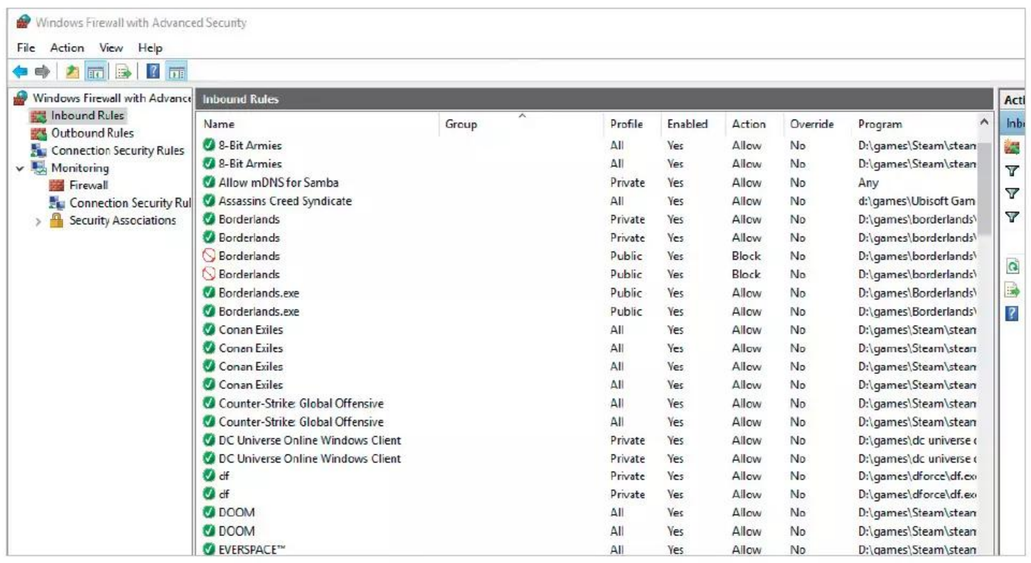
STEP 3 Down the left-hand side are some links that will help you configure and improve the firewall, as well as turning it on or off (which isn't recommended under any circumstance other than the installation of an improved third-party firewall). To begin with, start by clicking on the Advanced Settings link.



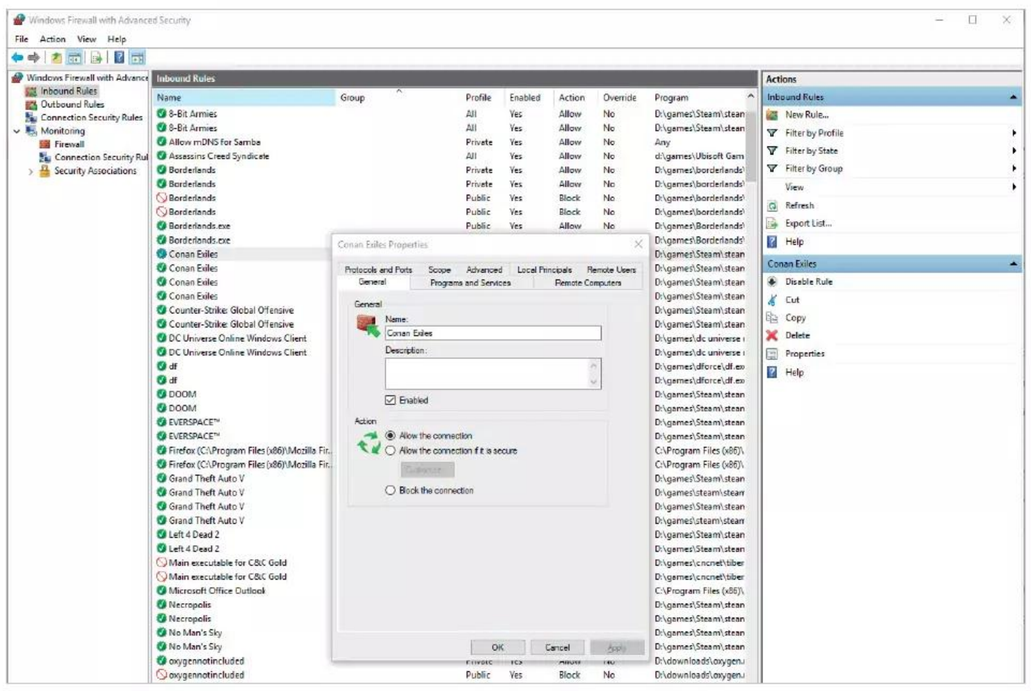
STEP 4 The Advanced Settings link launches a new console window. This new console defines the inbound and outbound rules for the entire system and its installed programs and applications. You can set authentication rules between computers, view and create new firewall rules, view the current firewall policies and even monitor what's being blocked in realtime.



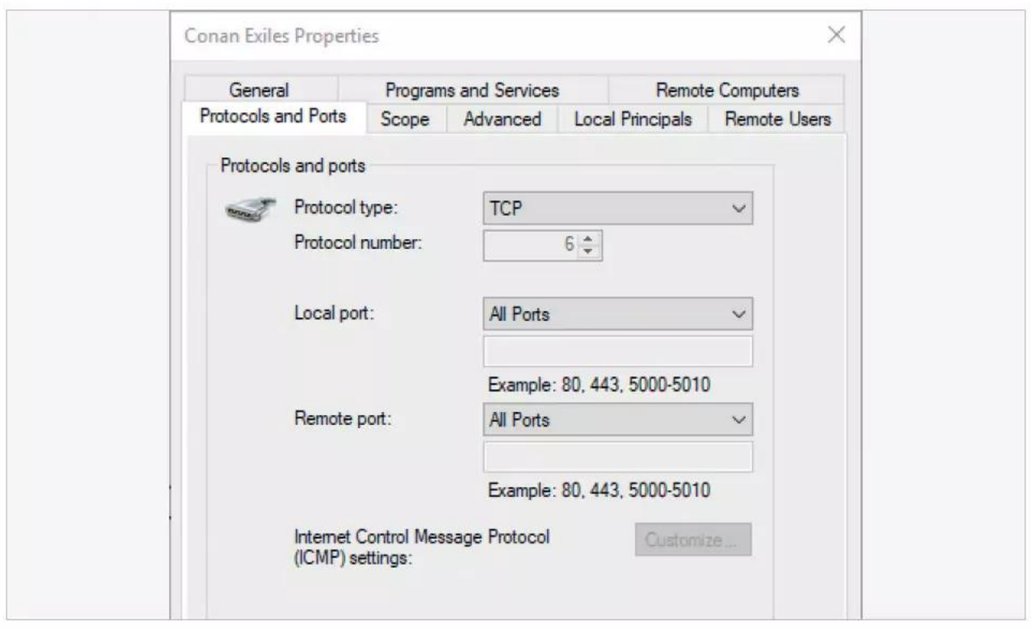
STEP 5 Click on Inbound Rules to the right-hand side of the main console window. This will list the current rules that allow traffic into your computer and to the applications that require it. For example, in this screenshot there are rules for various games that allow multiplayer interaction and the ability to 'talk' to the game server as well as install updates.



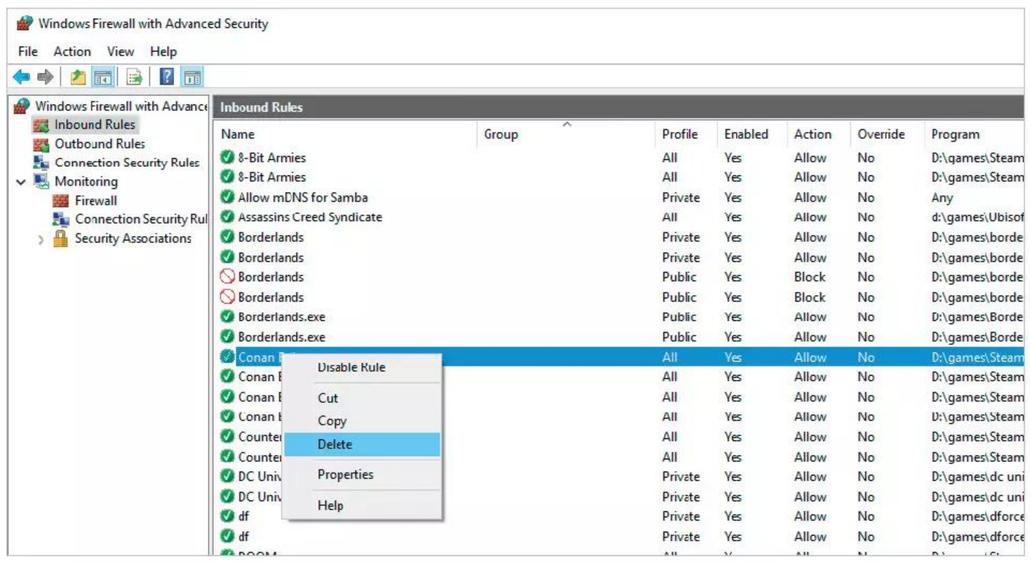
STEP 6 These rules are automatically entered into the firewall when you install the program, game or app. When you install a program you're required to accept and authenticate the process, clicking on Yes to start the installation. This level of administrative access also allows entry of the program into the firewall. Pick one of the entries and double-click it.



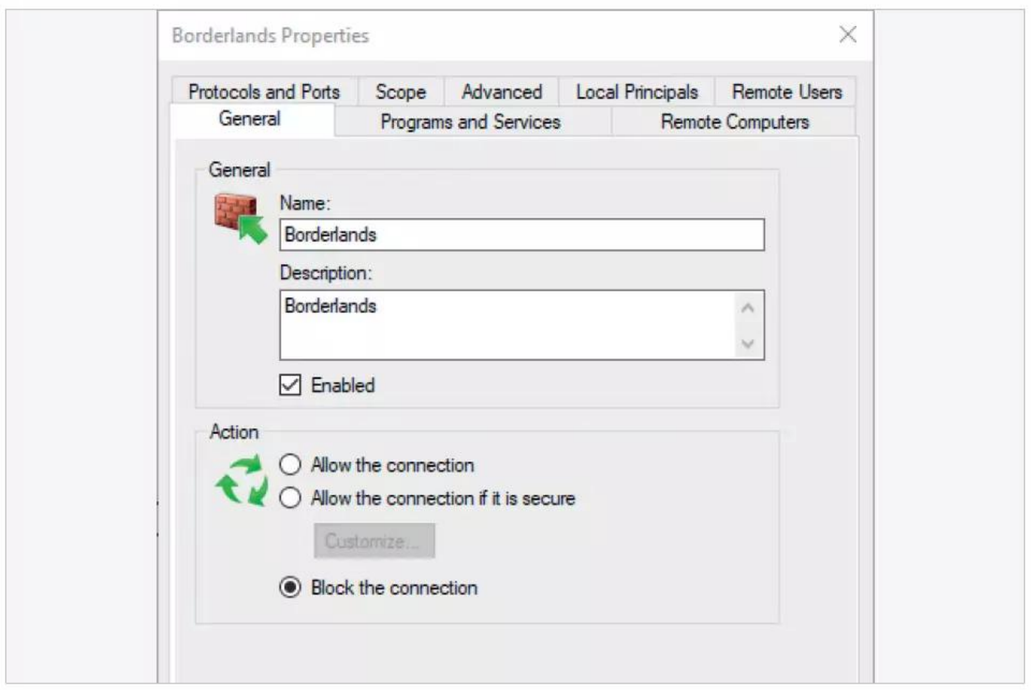
STEP 7 The properties of each firewall entry allow a greater degree of control for that particular program. You can change the name of the entry, allow or block the connection, define the physical location of the program on your computer, allow access to the program from remote computers, set the protocol and port number it uses and even which network controller to use.



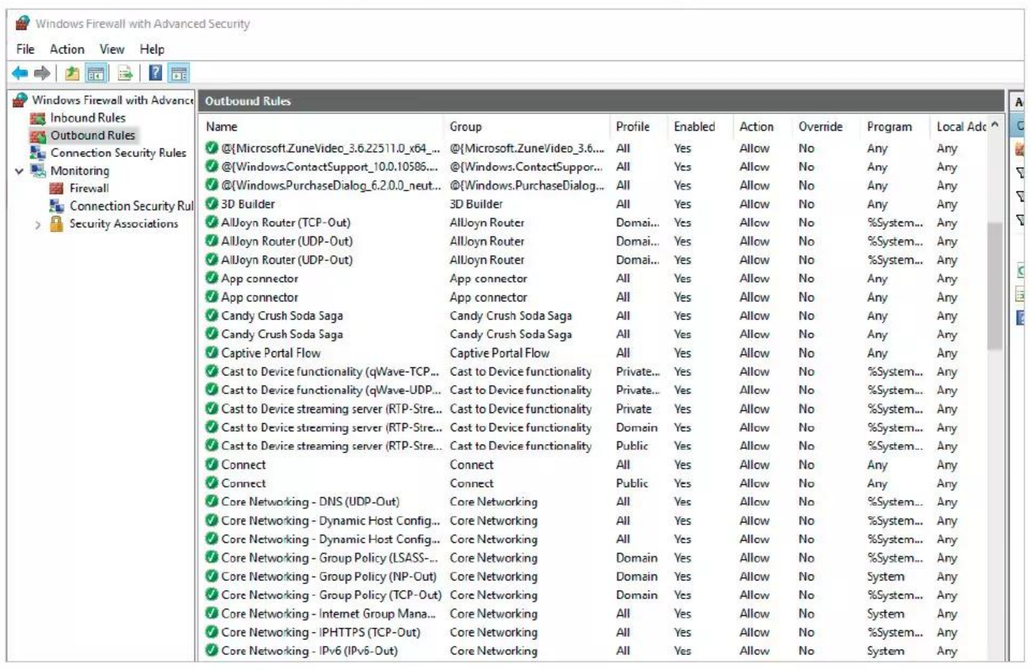
STEP 8 Sometimes, uninstalling a program doesn't automatically remove it from the Windows firewall. The exact reasons why are varied but to help improve the efficiency of the Windows firewall, whenever you remove a program from your system, it's worth checking the firewall to see if its entry has been deleted. To delete an entry, right-click then select Delete from the menu.



STEP 9 You may not want to delete a rule as it could be used later or if you reinstall the program and it fails to recreate the firewall entry. The recommended process then is to block the rule from communicating with the outside world. To do this, double-click the rule and from the General tab click the Block the connection button.



STEP 10 Similarly, the Outbound Rules link will detail the various programs that are allowed to communicate from your computer to an external destination. It's good practise to familiarise yourself with the rules of the firewall, as a rogue program will need to set a rule to communicate. You can then block that rule and stop the threat from reporting back.



Creating a Security Plan

A security plan will help you form a better strategy when it comes to tackling your Windows and home network security. A good plan will help keep on top of backups, updates and possible areas of weakness that malware or hackers can exploit.

Plan for the Worst, Hope for the Best

There's a lot to consider when coming up with a good security plan. It's not just a case of occasionally checking for an OS update on your own computer, you have to take into account other computers and the entire network.

An effective security plan should encompass the whole of your network, which includes Windows computers, Android and iOS devices, your router, any powerline adapters, Wi-Fi coverage, access passwords and even where the Ethernet cable runs through.

It may sound a little extreme but like most checklist-type scenarios it can be as in-depth as you like. However, it's worth at least considering some aspects of the home network and overall security before starting a plan.

Users

More than likely the 'user' is the most vulnerable point of access and the biggest security threat to any system or network. Whilst you can have the greatest AV suite and water-tight security system in the world, the user who carelessly visits unbeliveableandobviouslyfakedeals.com is the one that's going to cause you the most headaches. In a home network that's often youngsters, those who don't quite understand the whole Internet security element.

Whilst most youngsters are more tech-savvy than us adults, there's an age range where they'll happily click a link from a friend or something they've seen that looks cool. Therefore take the time to educate and frequently check their accounts or computers for anything suspicious. If possible enforce limits to their browsing and regularly update the browsing rules to make sure they're not going where they shouldn't. Remember, it's not just viruses that a child can download, they could potentially see something that would affect them emotionally.

"Users form the most vulnerable point of access for security on any system. Educate and make sure they're safe."

Updates

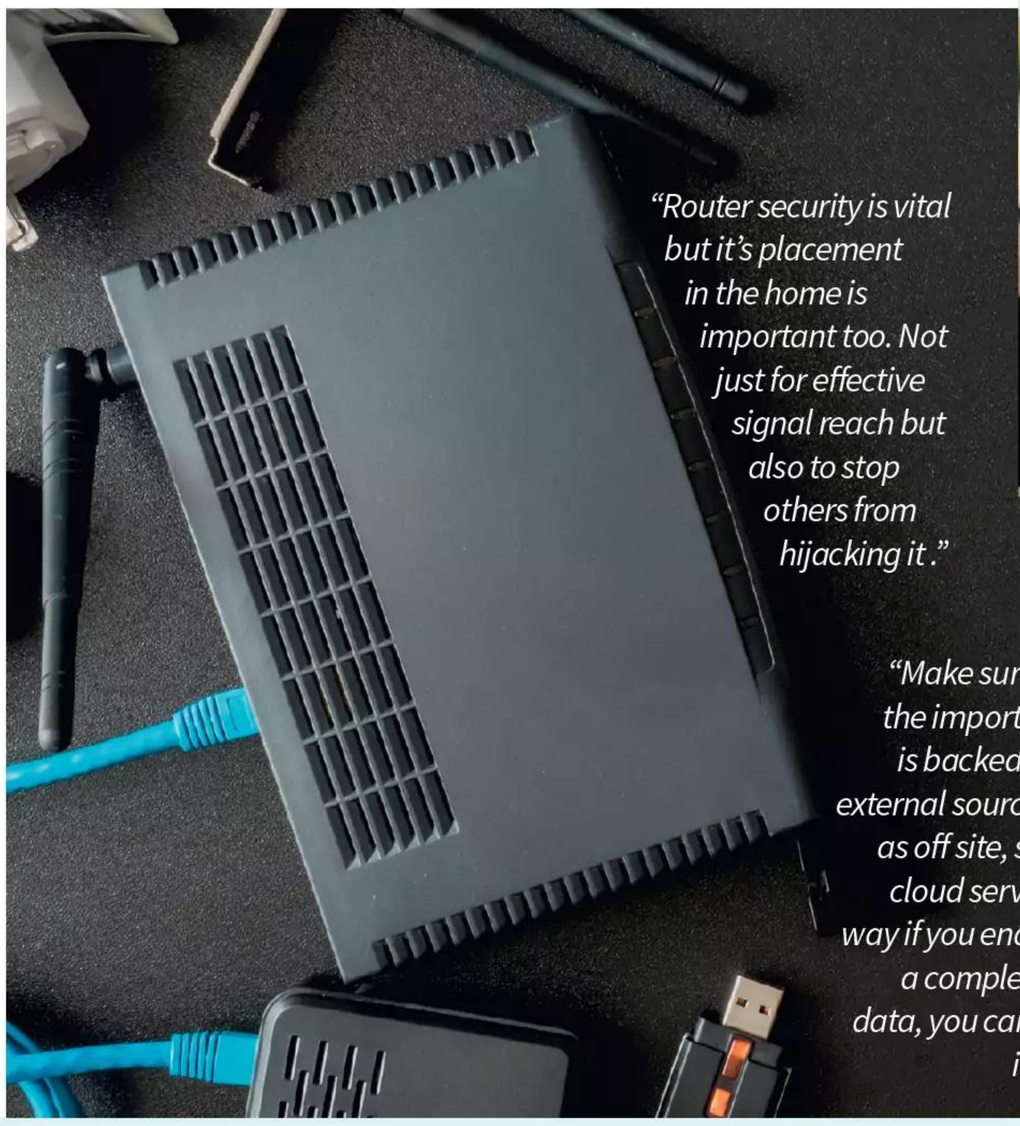
Obviously a must-have section of a good security plan is to regularly check for system and program updates. Thankfully, Windows and most security suites will run an automatic check whenever the system is powered up and connected to the Internet. However, there's always some point where an update failed to initialise for some reason or another. Therefore, it's often best to manually check.

Consider too checking for updates for the most frequently used programs. Microsoft Office, GIMP, your browser and even games will inevitably have an update available which can enhance, protect and improve the security of the program. After that, make sure that the other installed programs on the system are up-to-date too, as it's best to make sure there's few weaknesses as possible.

Programs

It can be difficult to keep track of what programs are installed on a system but it's not impossible. If you're serious about the security of your home network and its systems, then taking stock of what programs are installed on each system is worth doing.

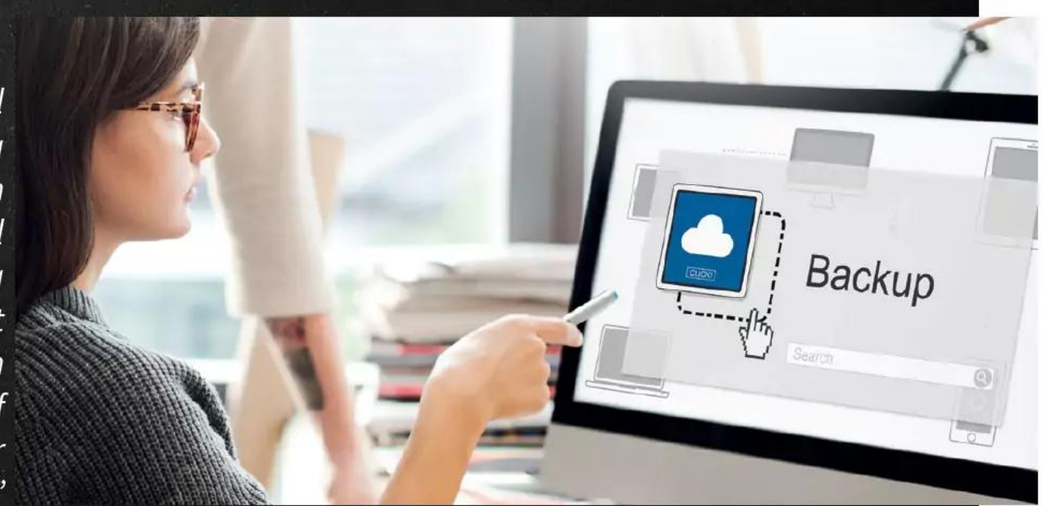
Running through a checklist of installed programs you may notice one that shouldn't be there. A quick lookup of the program may reveal that it's a popular backdoor for hackers to get into a system and the attached network. That being the case, it needs to be removed and any firewall entries checked and disabled.



"Router security is vital but it's placement in the home is important too. Not just for effective signal reach but also to stop others from hijacking it."

"Keep all your software up-to-date, including AV suites, programs and the operating system itself."

"Make sure that all the important data is backed up to an external source as well as off site, such as a cloud service. That way if you end up with a complete loss of data, you can recover it easily."



Routers

The family router is the first point of access for anything malicious on the network, since it's the gateway to the outside world. Make sure that the router software is up-to-date and that it's using the best possible wireless security standards and encryption.

It's also beneficial to make sure that the router's admin password and access passwords are hidden from sight. It doesn't take much for someone to look through the front window and make a note of a router password that's carelessly on show for all to see. Consider too, that not all visitors to your home are going to be chivalrous towards viewing your network password.

It's also worth tracking the range of the wireless signal from the router. By installing and using a good Wi-Fi scanner on a mobile device you can tell where the Wi-Fi signal from your router lies beyond your home. Whilst it's good to have a powerful signal, it won't take much for someone to sit nearby with a laptop (or a neighbour) and hack into your network. A Wi-Fi analyser will help you determine the best placement for security and more efficient use of the signal.

Passwords

It's not common for a home user to frequently change their password to the same degree as would an office worker but it's certainly something worth implementing. Using a combination of a good password manager and generator, you can set a 30-day password limit for all users and their access to the sites they visit.

It might sound like an awful lot of hard work on the part of everyone involved but weak passwords and the same password being used across Facebook, banking and gaming is a huge security vulnerability.

Backups

We'll cover backups in a few pages time but for the meantime though making sure that each account and computer is regularly backed up can take much stress out of a security situation. If you're unlucky enough to catch a virus or other malware, or are unfortunate enough to be hacked, you'll need to act quickly to prevent any loss of personal information. This usually means wiping your computer completely.

Having a good and reliable backup solution will help you recover your valuable data in no time, should you ever need to wipe everything or all your data is compromised through malware. It's also worth thinking of investing in a fireproof safe to store your backups along with cloud options for off-site backup security.

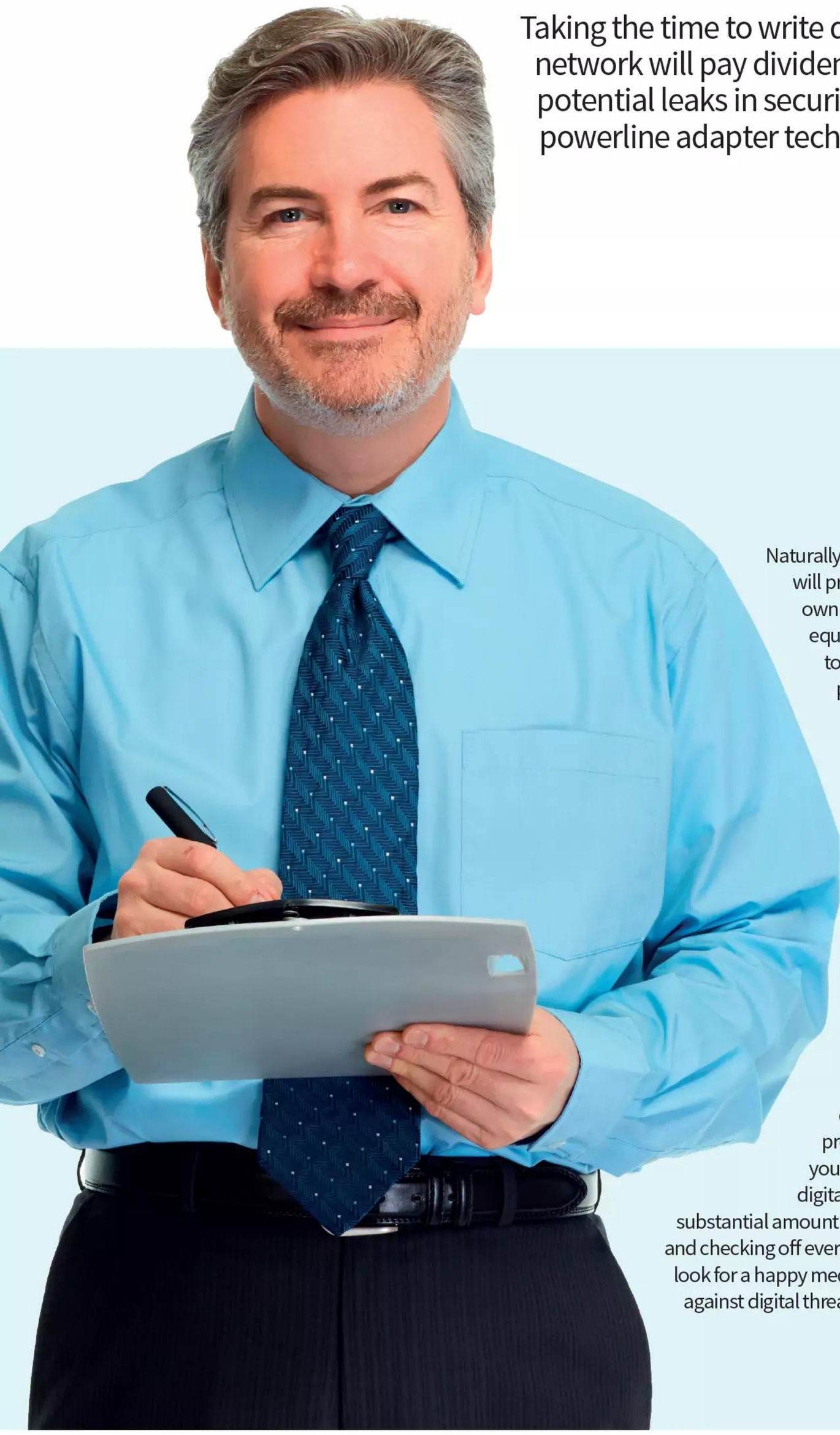
Cabling

It's not always something you need to check but ensuring that the home's Ethernet cabling is secure is an essential element to network security. For example, if you live in shared accommodation, it's possible for a neighbour to be able to be able to connect to your Ethernet cable and steal your bandwidth or gain access to your network resources.

If you can implement all or just some of these elements into your plan, you will be well on the way to making sure that your home network is as secure as possible, without becoming too paranoid over potential threats from outside sources. After all, you lock your doors when you're not at home so why shouldn't you lock your network too.

Windows Security Checklist

Taking the time to write down an effective security plan for your home network will pay dividends in the long run. With it you're able to spot potential leaks in security, secure your home network, Wi-Fi and powerline adapter technologies, and ensure digital peace of mind.



Naturally, this is just our example and will probably be different to your own setup and depending on the equipment you have available to you. For the sake of this publication we've taken a more generic approach but it's worth using it as a foundation from which you build your own, personal and unique checklist. Your checklist can be as intricate as you like, detailing specific hardware or software on one or all your computers, devices and so on, that needs to be updated regularly. Just remember though, there is a point where you can become a little too security conscious. Whilst it's great to be prepared for anything, and run your home network like a veritable digital Fort Knox, it can take up a substantial amount of your time applying patches and checking off every item on the list. Therefore, look for a happy medium, whilst remaining vigilant against digital threats.

We've come up with a template security checklist that you can use to create your own, for your home network. Remember to tick each section and remember to keep checking regularly and alter it as new devices are added.

> **"Plan Ahead"**

Checklist

Router

Make sure that your router's admin password and access passwords are in a secure, unviewable place. So visitors can't see them when they come into your home.

Wi-Fi Security

Login in to your router and check that the Wi-Fi is using WPS2. Then check the currently attached devices for any anomalies. If you use any other form of router security, double check it's still functioning as updates can reset routers.

Wireless Positioning

Using a Wi-Fi analyser on your phone or tablet, measure the impact of the wireless signal from the router. If it's reaching out into the street and not so much the rear of the house, then consider moving it. Keep an eye on the signal power and weak locations.

OS Update

Check for any operating system updates on all the computers and Windows mobile devices that connect to the home network.

Security Suite Update

Run a similar update check on any antivirus clients, VPN clients or other third-party security programs and applications.

Program & App Update

Run any update checks on frequently used programs and applications. After that, run as many updates on other installed programs on all your computers.

Installed Rogue Program and App

Check each computer on the network for its list of installed programs. If there's anything in there that doesn't look right, research it and remove it if necessary. Make a note of the programs installed (as a screen shot or physical note) and compare them with each frequent check.

Password Reset

Set a regular, usually 30-day, password reset. Each individual user should be able to reset all their passwords for every site they visit and make sure that the passwords they're using are strong. Use a password manager and password generator if needed.

Firewall Integrity

Check that the firewall on each computer, and potentially any devices, is up and running and that there's no rogue programs within the inbound and outbound rules set.

Backup Important Files

Make sure that each computer and device is regularly backed up. We'll cover how to effectively back up a Windows computer later on. Back up important documents and keep the backup copy somewhere safe; consider purchasing a fireproof safe.

What is a Sandbox?

Sandboxing is an important security technique that's used by companies and individuals the world over. It's not something the average user will normally come across but you can guarantee that every piece of software you use has been sandboxed at some point in its development.

Playing in the Sand

Everyone from software developers and security experts to the hackers themselves will use a sandbox environment to help build and test their products; so what exactly is a sandbox?

Just as the name suggests, a sandbox is a place where you can do something without it affecting the surrounding area: visualise a sandbox in the middle of a garden. In digital security terms, this means a sandbox is a tightly controlled environment that's isolated from the main operating system where a person can test or analyse software and its impact on a virtual system.

The sandbox can be one of a number of implementations: web based, operating system based, program based, network based or even emulating interaction with the Internet. There are countless more examples, each depending on what exactly is being tested and what functions are required to complete the test.

For security, a sandbox is usually an extremely isolated environment that doesn't have access to anything on the company network, or any contact with a host machine. Here the security expert is able to conducts tests on untrusted pieces of code, known malware and viruses and even website content. Should those tests reveal something nasty within, the security expert is able to work their magic and develop a fix that can be further tested and finally deployed to the company's servers, where it's downloaded as updated virus definitions by the security suites and applied to a customer's computer.

Imagine that from the point of view of a hacker, then. The hacker has developed a particularly nasty piece of code that could bring down government agencies and cause widespread panic among the global digital community; they're hardly going to test it on their own computer. They need to create a sandbox environment whereby they can trigger the malware, ransomware or whatever, and let it run its course. In the meantime they can run through various procedures to try and wipe the malware, as a security expert would, to find any weaknesses. Once they've perfected the malware and wiped out any perceivable vulnerabilities, they can then happily upload it to the Internet and sit back as the world is infected with their code.

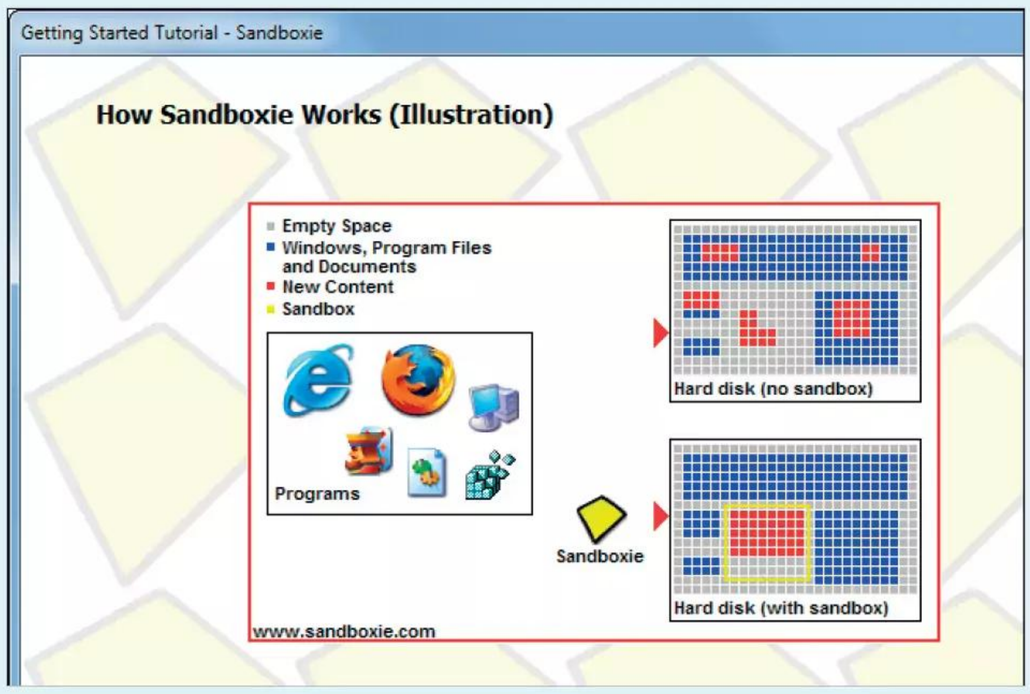
It's not always the testing of malicious code that's associated with sandboxes. For example, the words you're reading now were written using Office 365/Word 2016. Before the product was released by Microsoft, the development team behind Word will have gone through extensive testing, making sure that all the individual components within and that make up Word 2016 all worked. To do so, they will have used a dedicated and separate environment to the one they're using to program on. This specialised environment will have mimicked a real world setup as much as possible, so that when the developer wanted to test something they could compile the code and execute it in an environment that wouldn't affect their normal day-to-day workplace.

The often severe lockdown of a sandbox system does make it difficult to emulate what the average user may be using. The standard desktop computer has many different elements, both hardware and software, that work together to make up the computer that you've customised and personalised. A developer, security expert or software tester can never hope to create something that works 100 percent with every Windows desktop system that's out there.

It's generally accepted then that when testing in a sandbox it's advisable to use as common a hardware and software setup as possible. This way, the developer will likely create a program that works on as high percentage of the computers available. Those computers that differ from the norm, and that may require a little more work for the product to install and work on, can then be dealt with through minor patching and bug testing.

So what's this got to do with you, we hear you say. Well, there are ways in which you can create your own sandbox environment to test in. Consider how many times you've downloaded software from the Internet and executed it without even examining how it may affect your computer. How many times do you visit websites and happily click on whatever message may appear without even reading it properly. With your own sandbox environment, you can download and install a piece of software and see how it runs within a test setup without it ever impacting your real machine. If you get into the habit of testing every bit of software in a sandbox first, you'll certainly be glad should the day come you discover a hidden virus in the folds of an otherwise harmless looking program.

> *Using a virtual machine as a sandbox is a great way to test programs for every version of Windows, not just the latest*



"Sandboxie is an environment designed to allow you to test programs without them being installed on your computer."

"VirtualBox is considered to be one of the leading and easiest to use virtual machines, where you can create a sandbox environment to test in."

Running Windows as a Sandbox

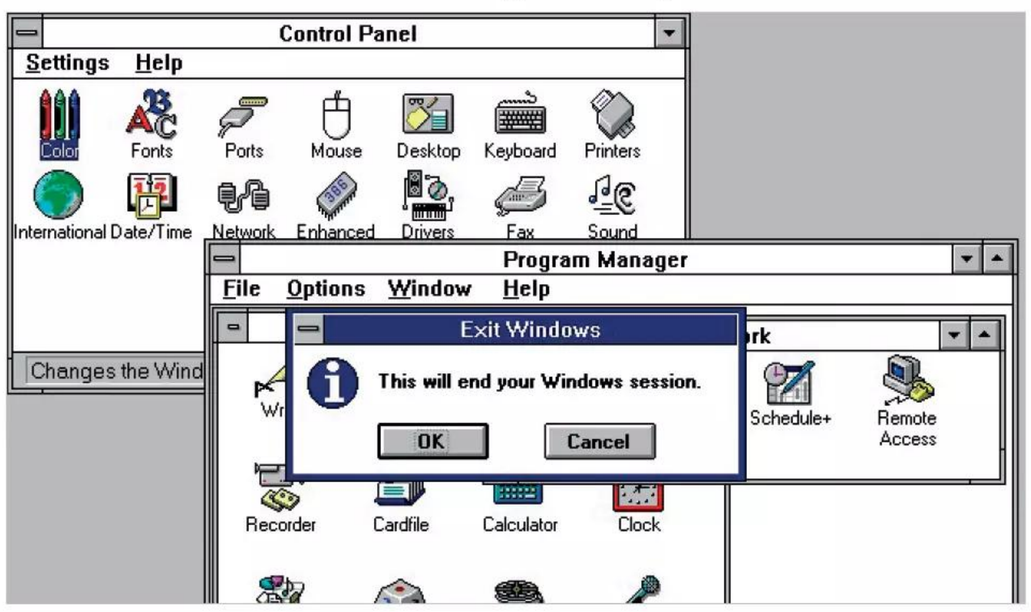
We've already talked about how a sandbox works and essentially what one is in terms of computing and security. However there are many advantages to creating your own virtual sandbox environment. It's not always purely to test suspicious code, as you'll soon discover.

Sand Between Your Toes

If you're still convinced that a sandbox environment can help you out, then read on. We've compiled a list of ten reasons why creating your own Windows sandbox is beneficial to the average user.

OLD PROGRAMS

Within the Windows virtual sandbox environment you may be able to run older programs that would normally fail, even in compatibility mode, under more modern hardware drivers. Often an older program will look for a specific driver set, if it's too modern then it can fail. Virtual environments use older type drivers by default.

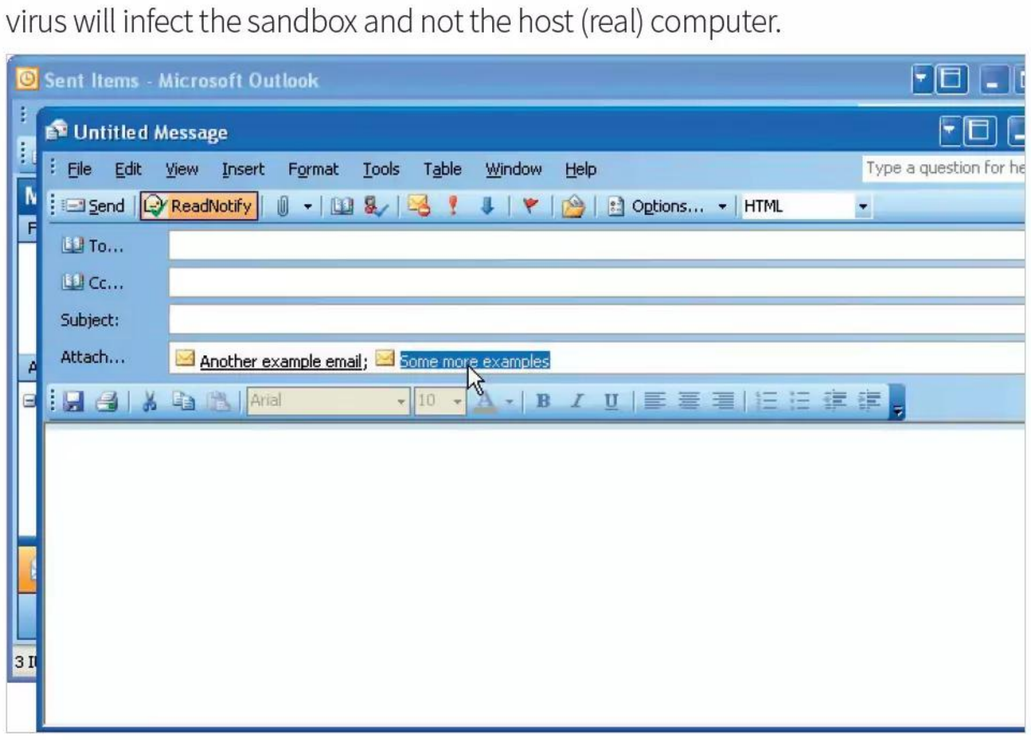


SAFE BROWSING

Within a virtual environment you can browse a site without any of its code being written to the main, host computer. This could simply be cookies and other such relatively harmless additions to sites or it could include data miners and malicious links.

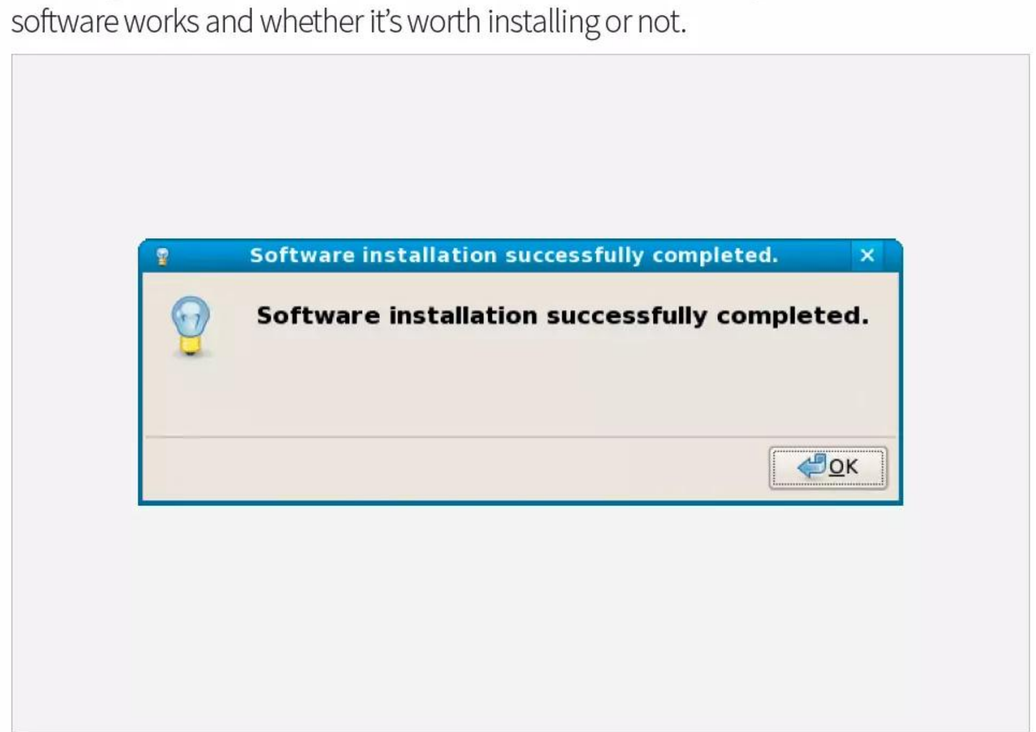
HOST PROTECTION

If you think that a download link or email attachment may contain a virus, then opening it in a safe, virtual environment is the safest bet. Of course, you shouldn't open any unknown email attachments but if you need to, do so in a sandbox. The virus will infect the sandbox and not the host (real) computer.



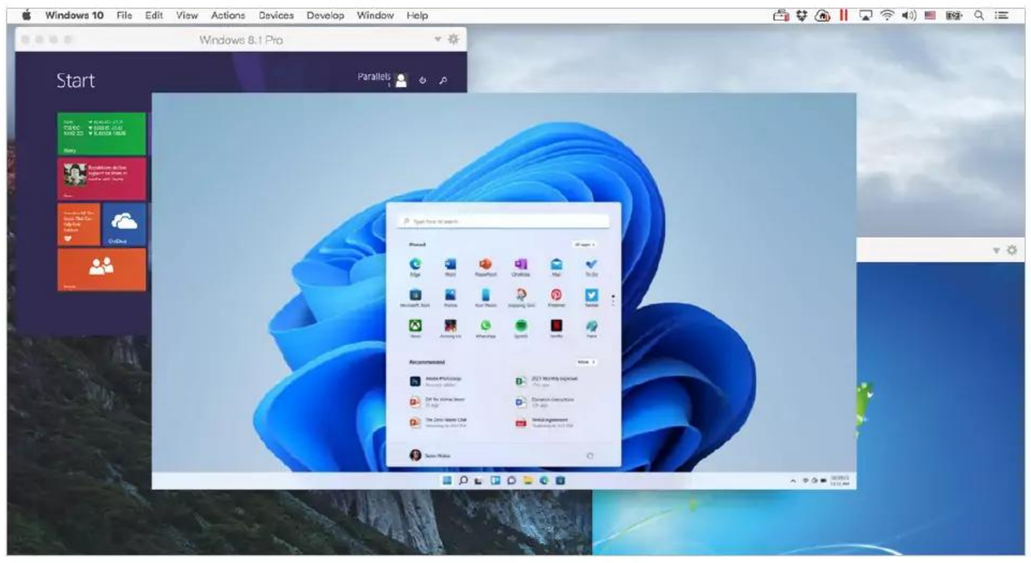
SOFTWARE TESTING

If you're serious about your security and the safety of your home computer, then you should be downloading and installing software in a test environment first before applying it to your real computer. A virtual environment is a great place to see how software works and whether it's worth installing or not.



VIRTUAL OS

The beauty of a virtual environment, such as one created by VirtualBox, is that you're able to run Windows, macOS and Linux operating systems on top of your host operating system, whatever system that may be. You can install Windows within a virtual environment whilst using Linux or macOS, or vice versa.

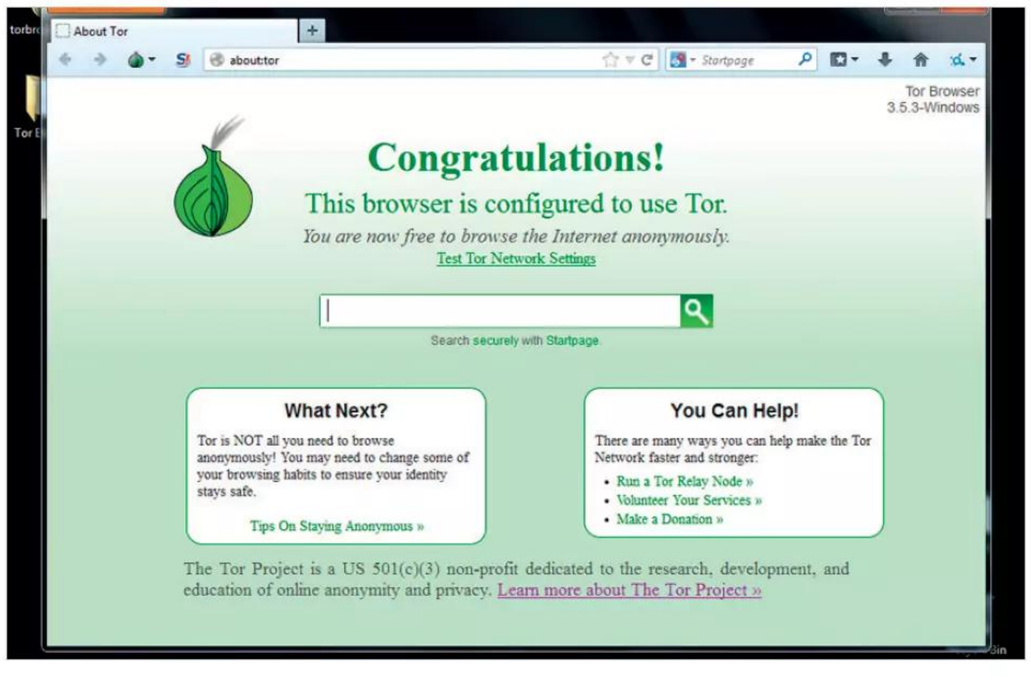


VIRTUAL BACKUP

It is possible to create a virtual copy of a physical machine. This is an excellent way of making sure that the entire machine, that is a snapshot of the OS as it was when copied, is safely backed up and accessible regardless of what operating system you choose to use.

SECURE ANONYMITY

Within a virtual Windows environment you're able to create an anonymity system. By this we mean, you can install a VPN and use the Tor network and surf the Internet without fear of being traced; and what's more, none of it will affect your host operating system.



SAFE DEVELOPMENT

If you're considering developing your own software and apps, then using a virtual environment is an ideal place to test the code as you create it. Should a function you've written have an adverse effect on the OS, then you won't damage your working system.

```
Program Check_Group
  use crystallographic_symmetry, only: Space_Group_Type, set_spacegroup
  use reflections_utilities, only: Hkl_Absent
  use Symmetry_Tables, only: spgr_info, Set_Spgr_Info

  ....... ! Read reflections, apply criterion of "goodness" for checking,
          ! set indices i1,i2 for search in space group tables ...
  ....... ! omitted for simplicity
  call Set_Spgr_Info()
  m=0
  do_group: do i=i1,i2
    hms=adjustl(spgr_info(i)%HM)
    hall=spgr_info(i)%hall
    if( hms(1:1) /= "P" .and. .not. check_cent ) cycle do_group ! Skip centred groups
    call set_spacegroup(hall,Spacegroup,Force_Hall="y")
    do j=1,nhkl
       if(good(j) == 0) cycle  !Skip reflections that are not good (overlap) for checking
       absent=Hkl_Absent(hkl(:,j), Spacegroup)
       if(absent .and. intensity(j) > threshold) cycle do_group  !Group not allowed
    end do
    ! Passing here means that all reflections are allowed in the group -> Possible group!
    m=m+1
    num_group(m)=i
  end do  do_group
  write(unit=*,fmt=*) " => LIST OF POSSIBLE SPACE GROUPS, a total of ",m," groups are possible"
  write(unit=*,fmt=*) "     ----------------------------------------------------------"
  write(unit=*,fmt=*) "     Number(IT)      Hermann-Mauguin Symbol     Hall Symbol"
  write(unit=*,fmt=*) "     ----------------------------------------------------------"
  do i=1,m
    j=num_group(i)
    hms=adjustl(spgr_info(j)%HM)
    hall=spgr_info(j)%hall
    numg=spgr_info(j)%N
```

FAMILY FRIENDLY

If you have a single-family computer, a virtual environment is a great place for the kids to go without fear of them potentially breaking the system. It doesn't happen often, kids are mostly more tech-savvy than adults but little fingers do have a habit of clicking things they're not supposed to. Virtual environments can be backed up and redeployed easily.

RESTRICTED ACCOUNTS

Again, using children as an example, a virtual child's Windows account can come with all manner of restrictions and monitoring software, to stop them from wandering into the scarier parts of the Internet, such as installing Net Nanny. Again, these controls won't affect the host computer or adult accounts.

Installing VirtualBox

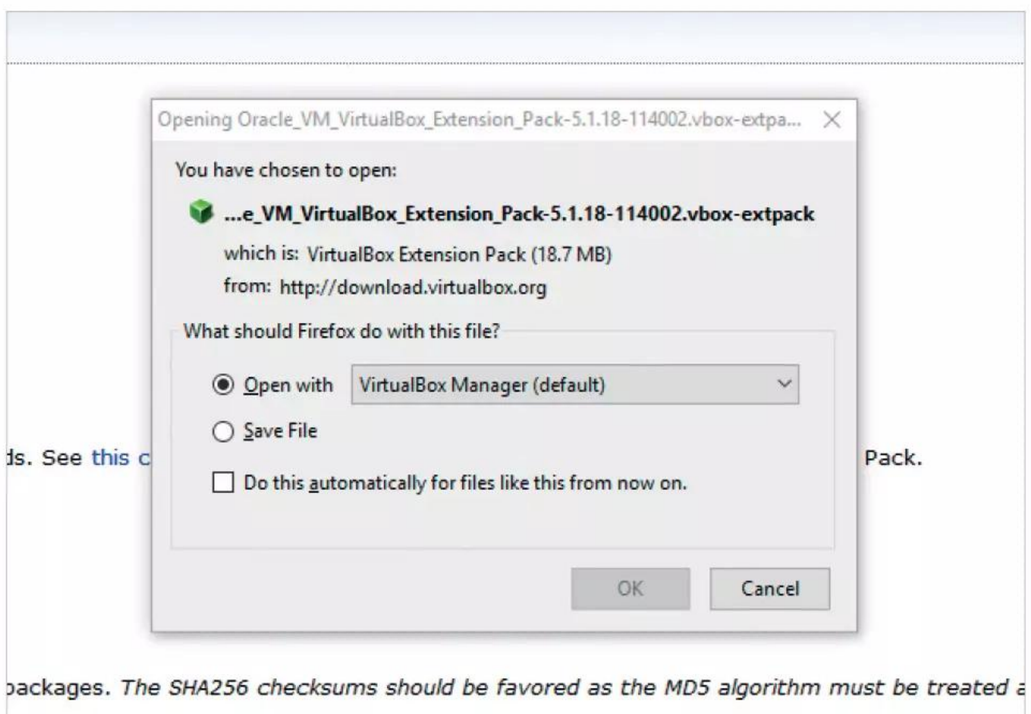
Oracle's VirtualBox is one of the easiest virtual machine platforms for the beginner to experiment on. Within it you can install Windows, Linux and even macOS for sandbox testing, without ever having to alter your main computer's setup.

Going Virtual

Using a Virtual Machine (VM) will take resources from your computer: memory, hard drive space, processor usage and so on. So make sure you have enough of each before commencing.

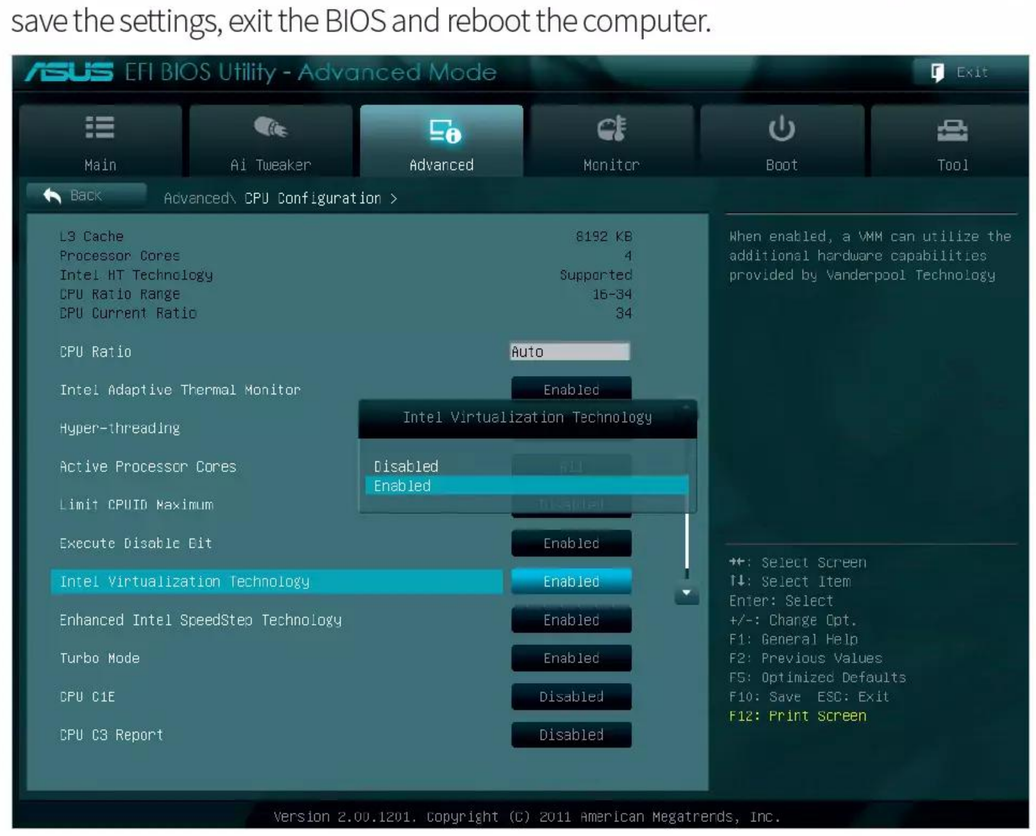
STEP 1 The first task is getting hold of VirtualBox. If you haven't already, head over to www.virtualbox.org and click on the large 'Download VirtualBox 5.1' box. This will take you to the main download page. Locate the correct host for your system, Windows or Mac, the Host is the current installed, main operating system, and click to begin the download.

STEP 2 Next, whilst still at the VirtualBox download page, locate the VirtualBox Extension Pack link. The Extension Pack supports USB devices, as well as numerous other extras that can help make the VM environment a more accurate emulation of a 'real' computer.

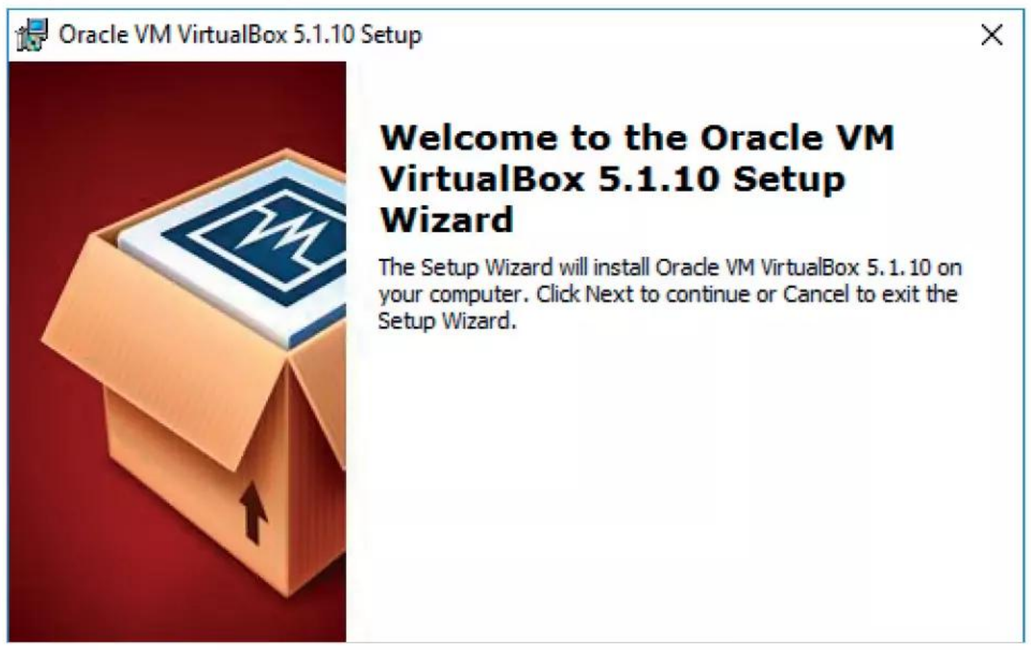


STEP 3 With the correct packages downloaded, and before you install anything, you need to make sure that the computer you're using is capable of hosting a VM. To do this, reboot the computer and enter the BIOS. When the computer starts up, press the Del, F2, or whichever key is necessary to Enter Setup.

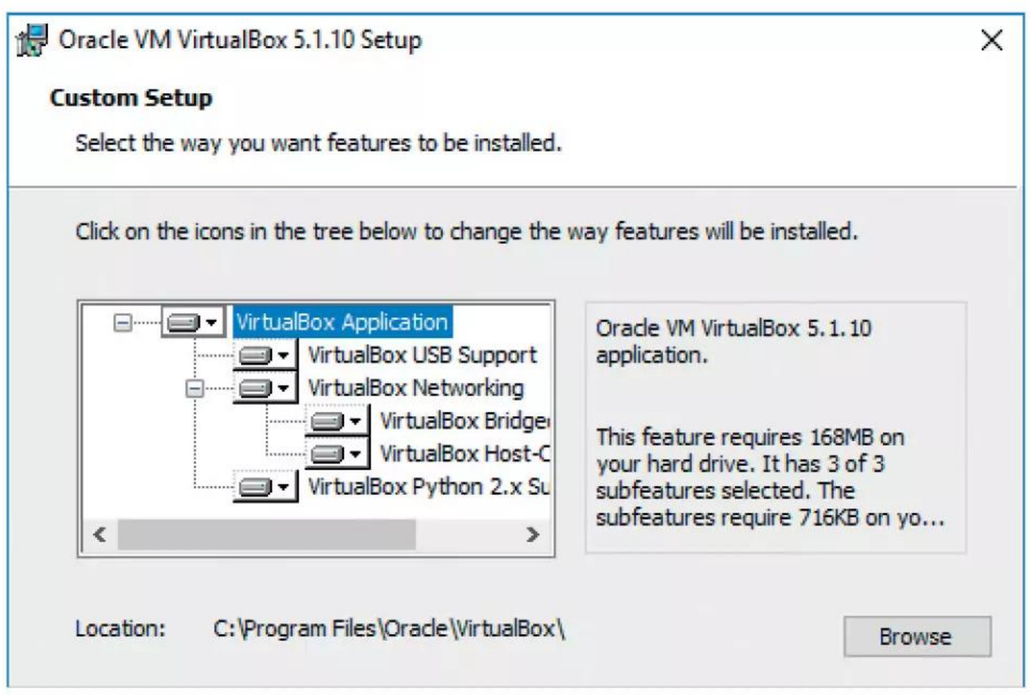
STEP 4 Each BIOS is laid out differently so it's very difficult to assess where to look in each personal example. However, as a general rule of thumb, you're looking for Intel Virtualisation Technology or simply Virtualisation: usually within the Advanced section of the BIOS. When you've located it, Enable it, save the settings, exit the BIOS and reboot the computer.



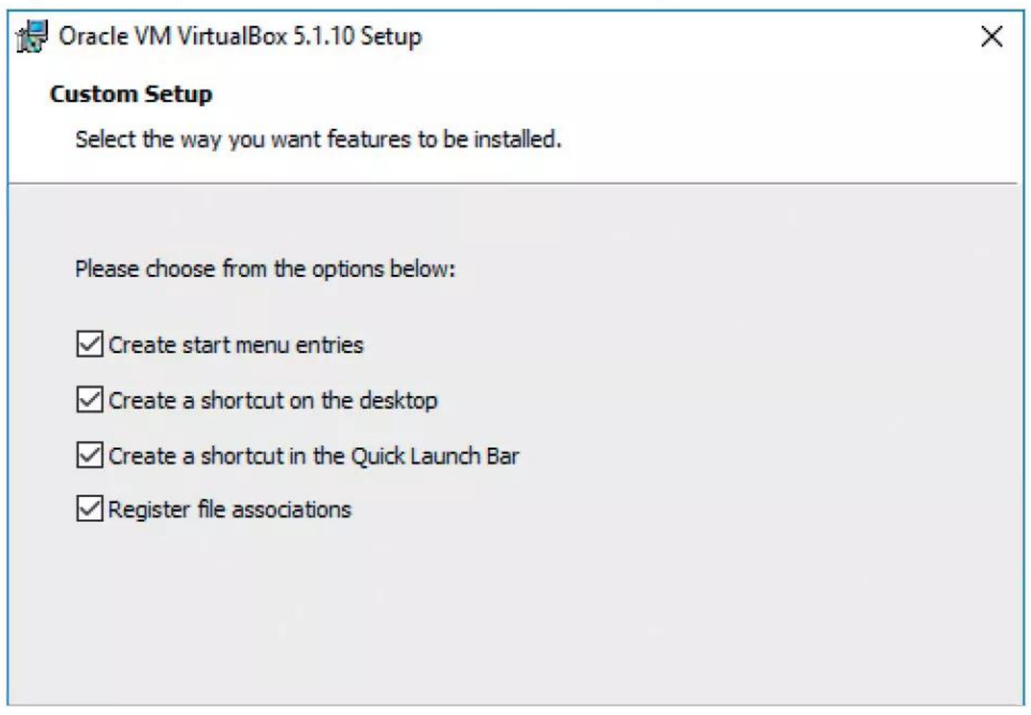
STEP 5 With the computer back up and running, locate the downloaded main VirtualBox application and double-click to begin the installation process. Click Next to continue, when you're ready.



STEP 6 The default installation location of VirtualBox should satisfy most users but if you have any special location requirements click on the 'Browse' button and change the install folder. Then, make sure that all the icons in the VirtualBox feature tree are selected and none of them has a red X next to them. Click Next to move on.



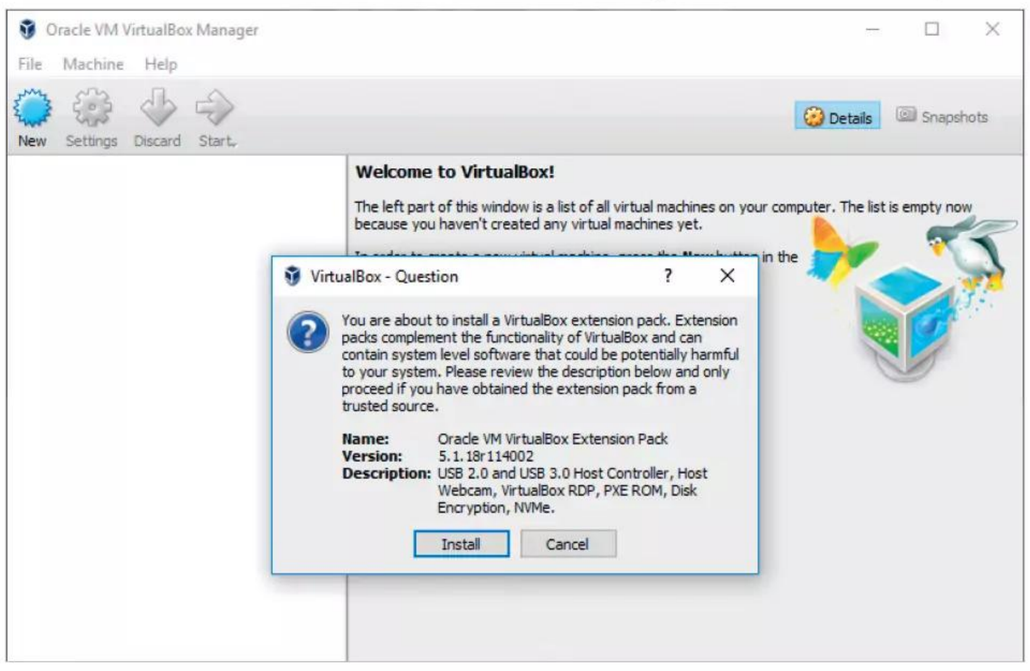
STEP 7 This section can be left alone to the defaults, should you wish. It simply makes life a little easier when dealing with VMs, especially when dealing with downloaded VMs, which you may encounter in the future. Again, clicking Next will move you on to the next stage.



STEP 8 When installing VirtualBox your network connection will be disabled for a very brief period. This is due to VirtualBox creating a linked, virtual network connection so that any VM installed will be able to access the Internet, and your home network resources, via the computer's already established network connection. Click Yes, then Install to begin the installation.

STEP 9 You may be asked by Windows to accept a security notification. Click Yes for this and you might encounter a dialogue box asking you to trust the installation from Oracle; again, click yes and accept the installation of the VirtualBox application. When it's complete, click Finish to start VirtualBox.

STEP 10 With VirtualBox up and running you can now install the VirtualBox Extension Pack. Locate the downloaded add-on and double-click. There may be a short pause whilst VirtualBox analyses the pack but you eventually receive a message to install it; obviously click Install to begin the process, scroll down the next screen to accept the agreement and click I Agree.



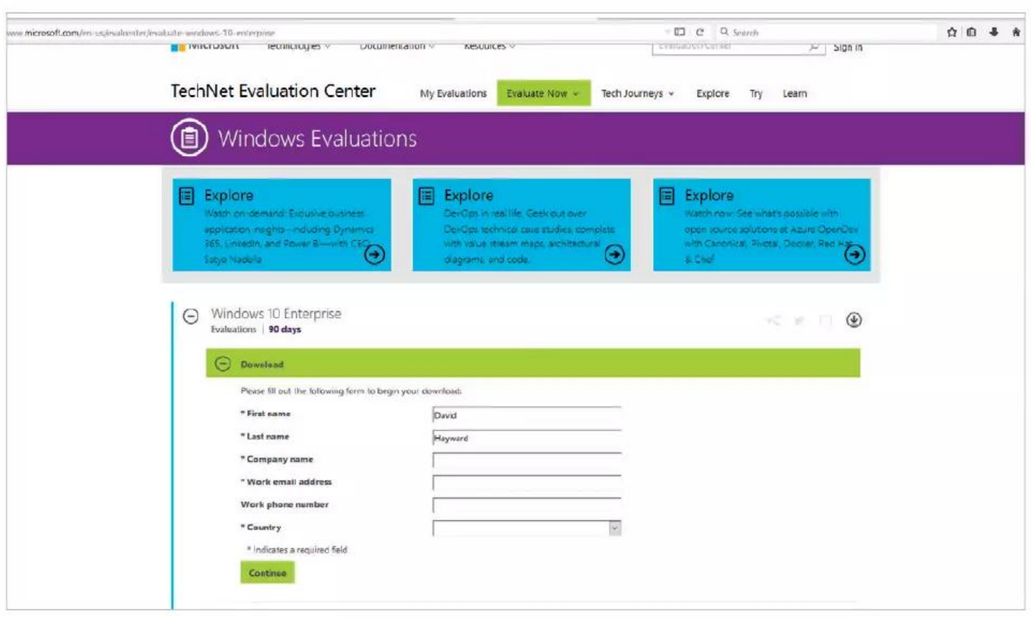
Installing Windows in VirtualBox

Installing Windows within a VM carries with it a clause: you need to make sure you have a valid license. However, if you're testing something then you can use the Windows Enterprise Evaluation image, which will last for 90 days.

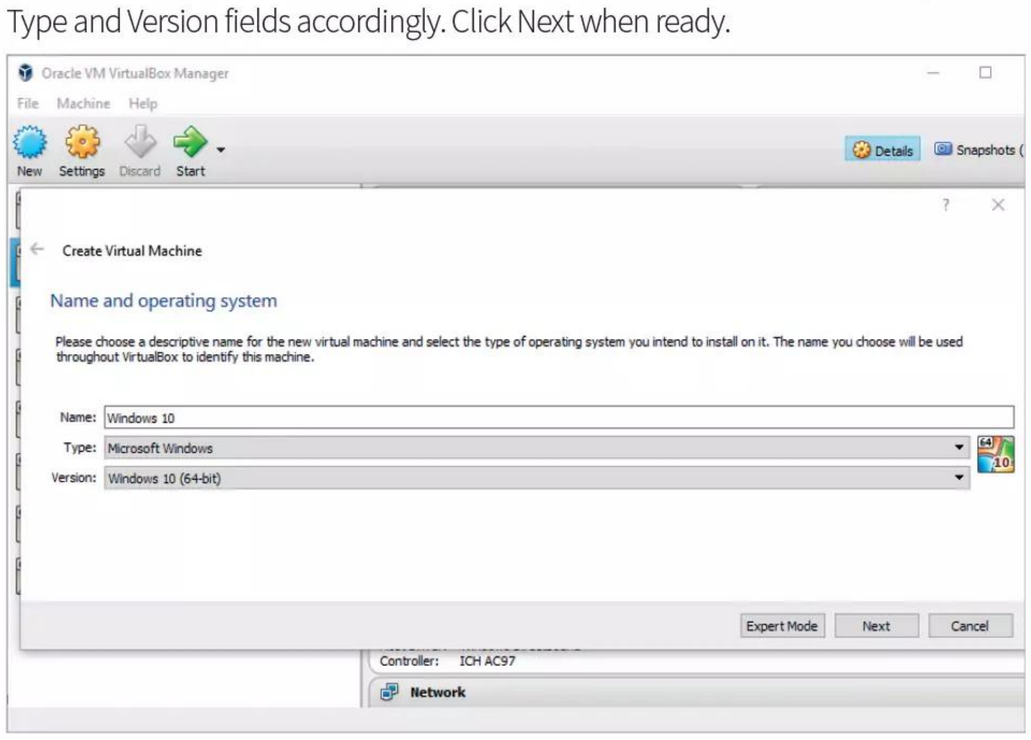
Window Installations

Naturally you might own a spare Windows license to use for the VM but for this tutorial we're going for the 90 day Windows Enterprise Evaluation model. To begin with, browse to https://microsoft.com/en-us/evalcenter/evaluate-windows-10-enterprise.

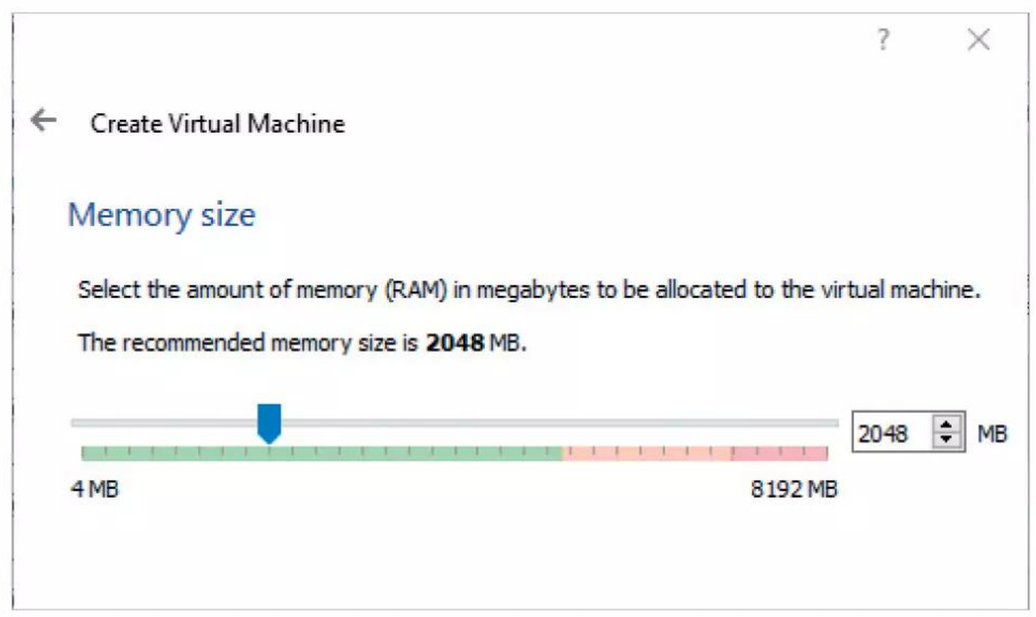
STEP 1 You need to register with Microsoft prior to being able to download the Windows image; simply click the Register button and fill in the required fields. When done, click Continue and choose the ISO Enterprise option, then your language choice and 64-bit, followed by the Continue button once more to begin the download.



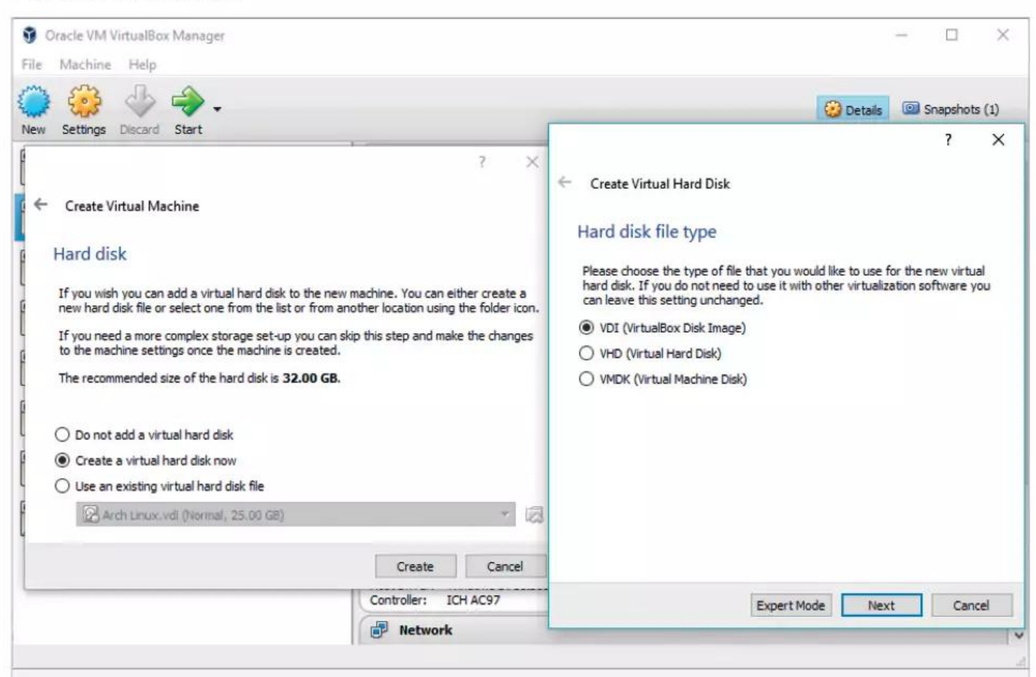
STEP 2 The ISO you're downloading is around 4GB in size, so it may take some time, depending on the speed of your connection. Open VirtualBox and click on the New icon located in the top right of the main VirtualBox window. In the Name field enter Windows, this should automatically change the Type and Version fields accordingly. Click Next when ready.



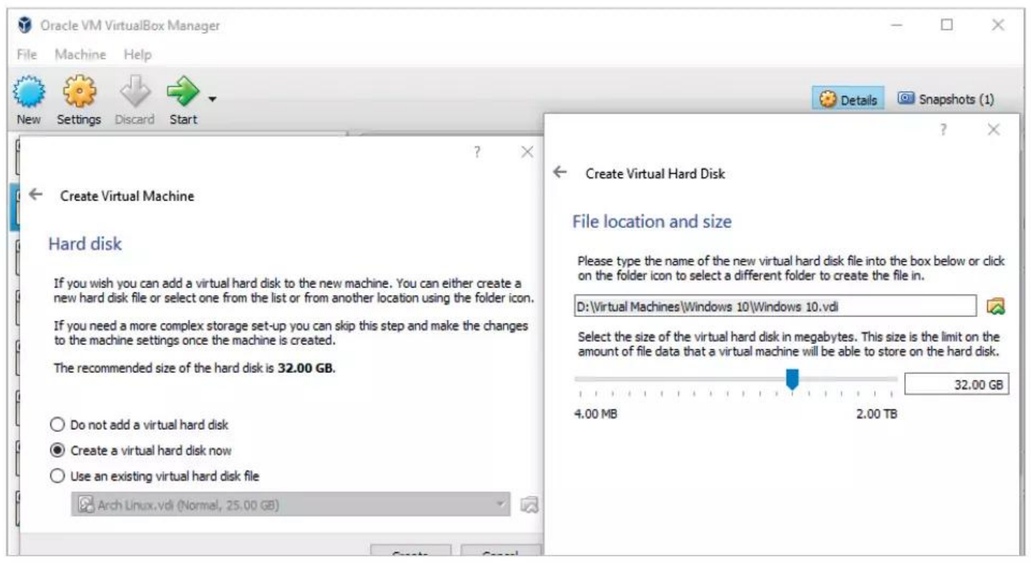
STEP 3 You need to set an amount of memory from your host computer to use as virtual RAM for the VM. Naturally, you don't want to take too much as your computer will suffer due to low memory when the VM is running. Ideally, you need to allocate around 2GB of memory to the VM. Click Next when ready.



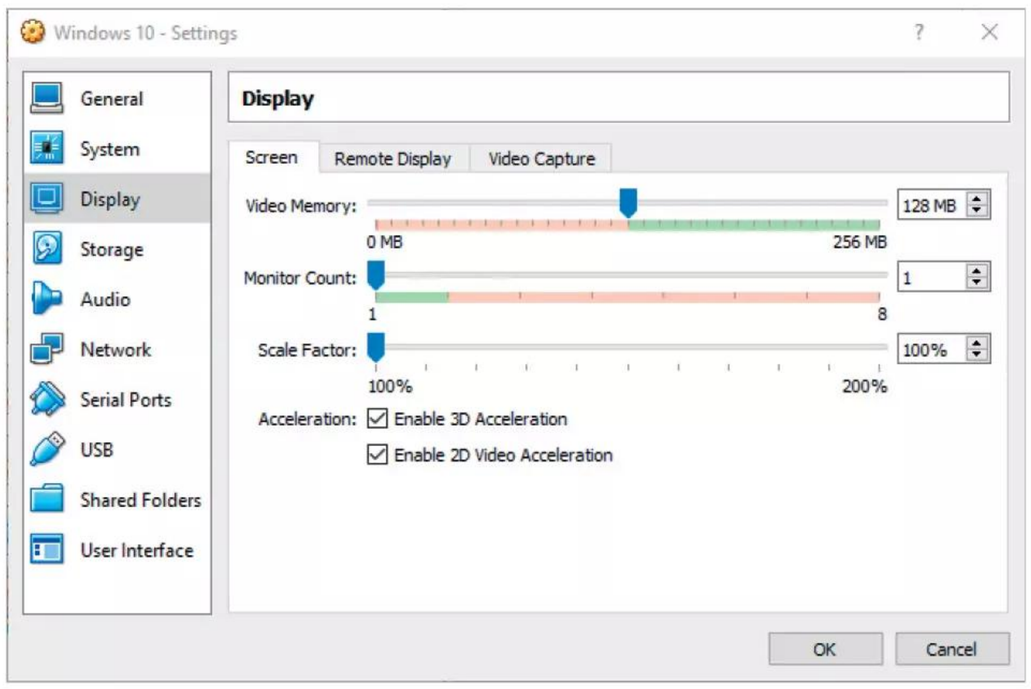
STEP 4 The next section will enable you to create a virtual hard disk, in which the Windows virtual machine can be installed. The default option: 'Create a virtual hard disk now' is recommended, then click the Create button to proceed. The pop-up box will detail the type of virtual hard disk; stick to VDI and click Next.



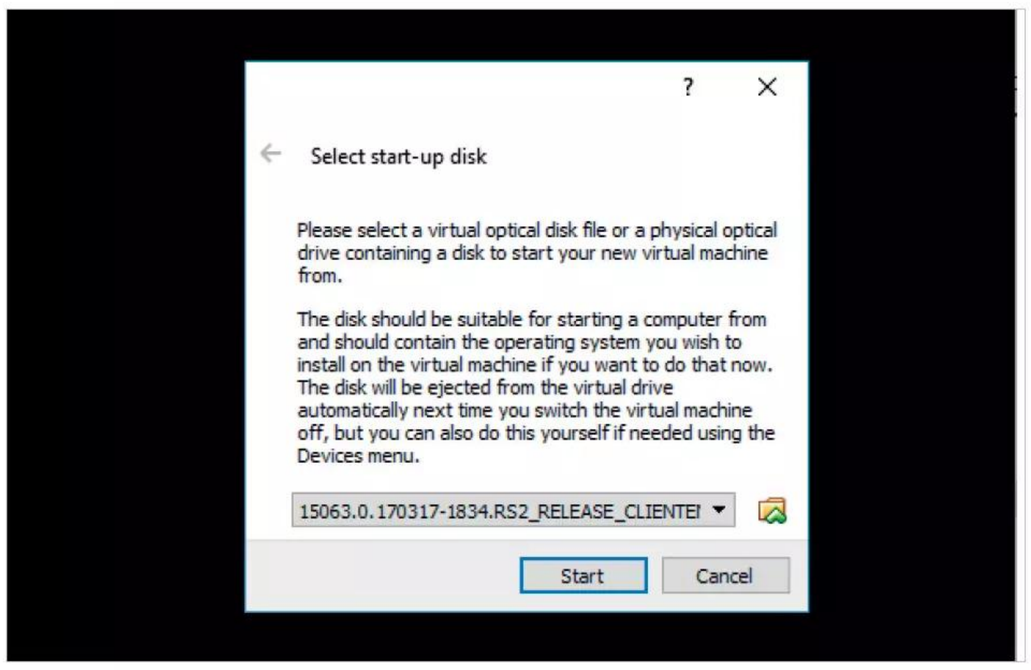
STEP 5 The default Dynamically Allocated option will suffice for this instance, so click Next. VirtualBox recommends that you allocate 32GB of physical hard drive space to creating the virtual hard disk. Make sure your hard drive has enough spare capacity and click the Create button.



STEP 6 The Windows VM is now listed in the available VMs in VirtualBox. Before you begin to install it though, click on the Settings icon whilst the Windows VM is highlighted. In the General tab, click Advanced and enable Bidirectional for Shared Clipboard and Drag 'n' Drop. In Display, enable 3D and 2D Video Acceleration. Click OK to finish.

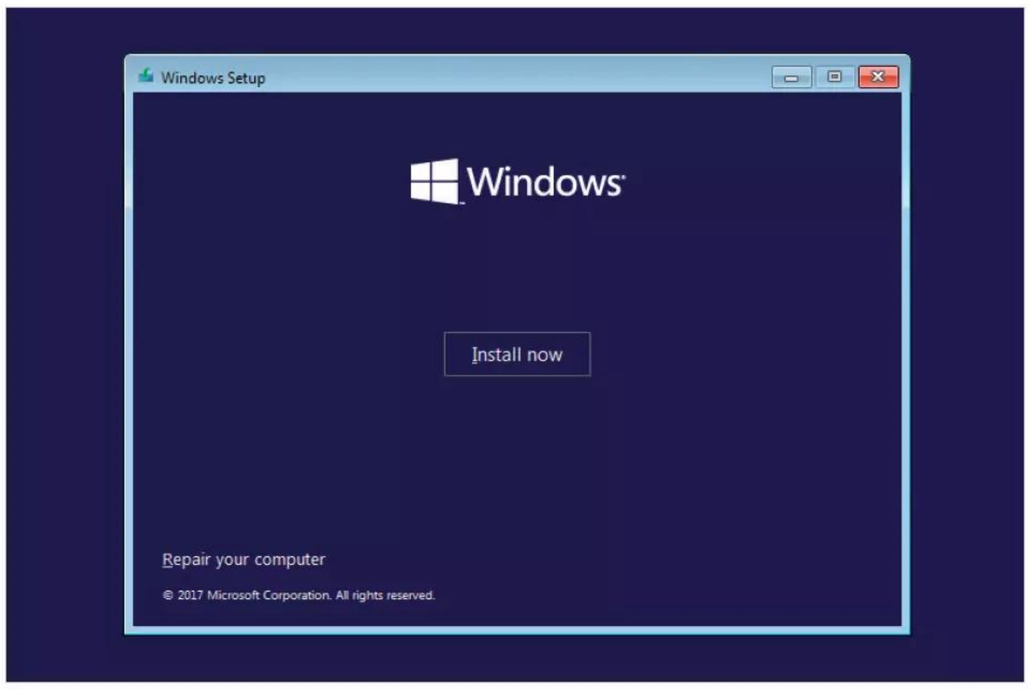


STEP 7 With the Settings console window closed, and the VM highlighted, click on the Start button. This will open a new window, asking for the location of the Windows ISO you downloaded from the Microsoft site in the first few steps. Use the folder icon to locate the ISO and click Open, then the Start button to commence the installation.

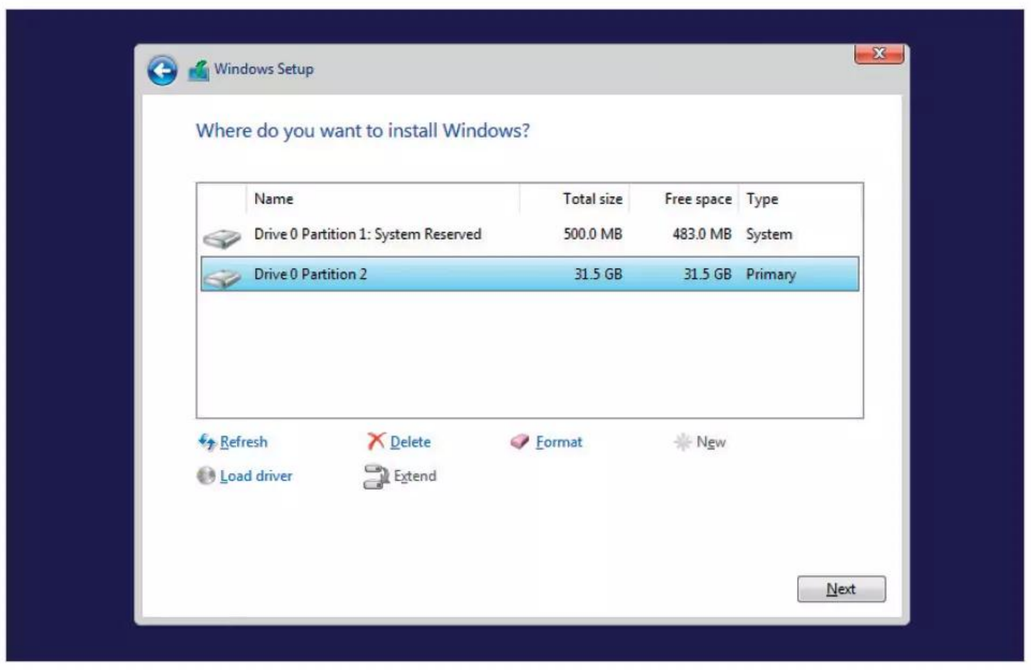


STEP 8 The Windows ISO will now load, and begin the installation process. The first options you need to set are the language, time and keyboard. Set your preferences, although the default is English US to begin with, and click on the Next button when you're ready to continue.

STEP 9 You now have an Install Now option available. Click it to begin the installation, then tick the license agreement box followed by Next. There are two possible options to install Windows, Upgrade and Custom. Since this is a blank hard drive, the Custom option is the only viable mode. Click it to continue.



STEP 10 The drive available will be the 32GB virtual hard disk you created. Click on the New button, then Apply to create a new valid drive that Windows can be installed on. You'll be asked what additional partitions will be created, click OK to accept. Choose the largest partition size and click Next to install Windows.



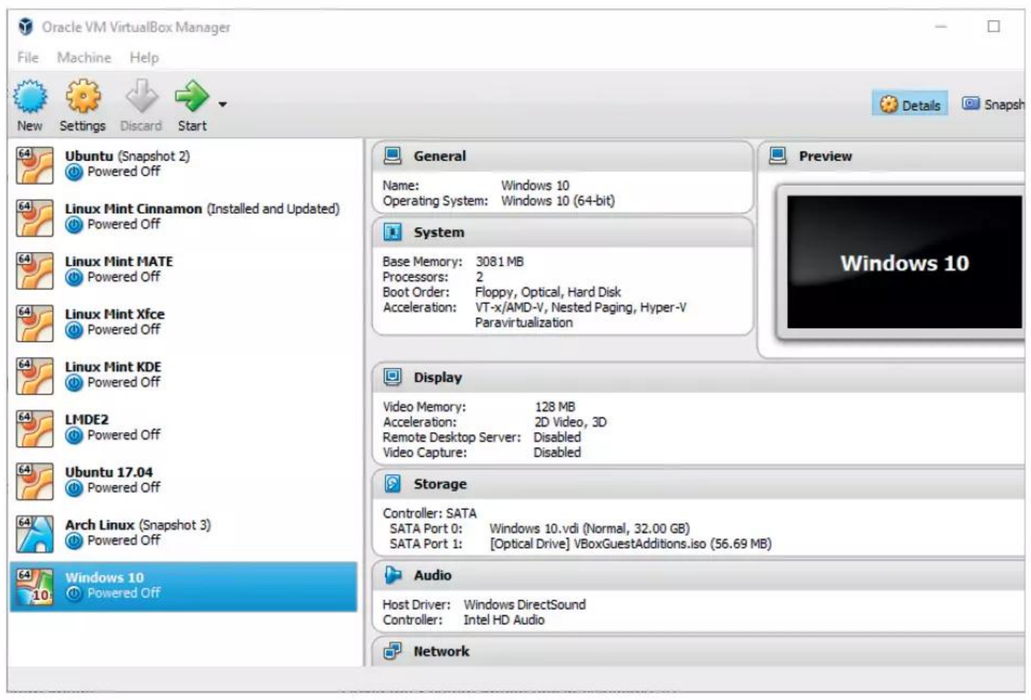
Creating VirtualBox Snapshots of Windows

One day the testing process of a Windows VM will inevitably leave the system in a broken or malware riddled state. You can wipe it and start again but a far better solution is to create snapshots, so you can easily revert to a previous build.

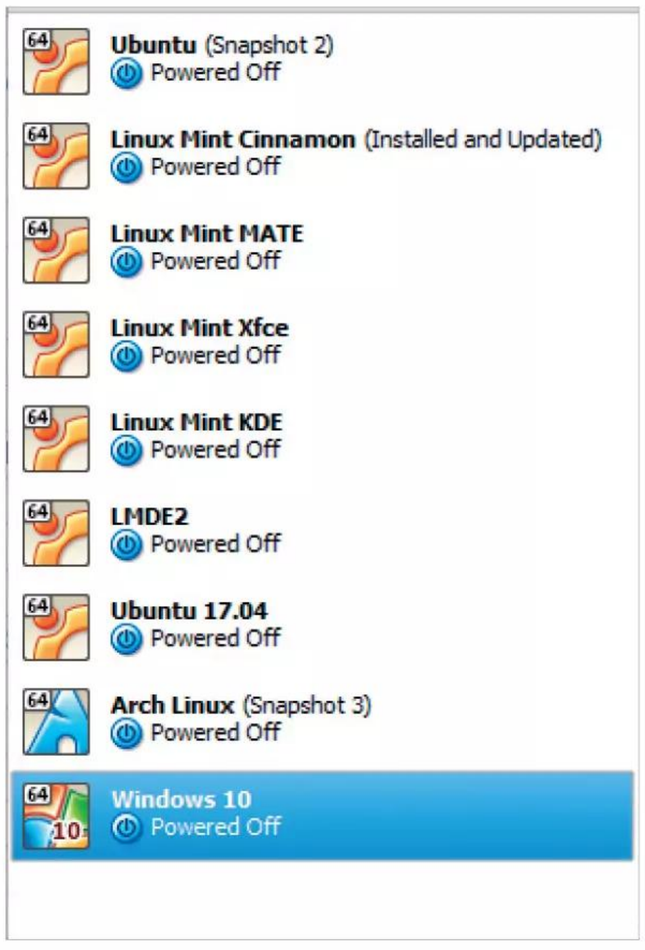
Take a Snapshot

Setting up Windows, installing the drivers, updates and programs takes a fair amount of time. If you take a VirtualBox snapshot, you can return to where you left off in an instant.

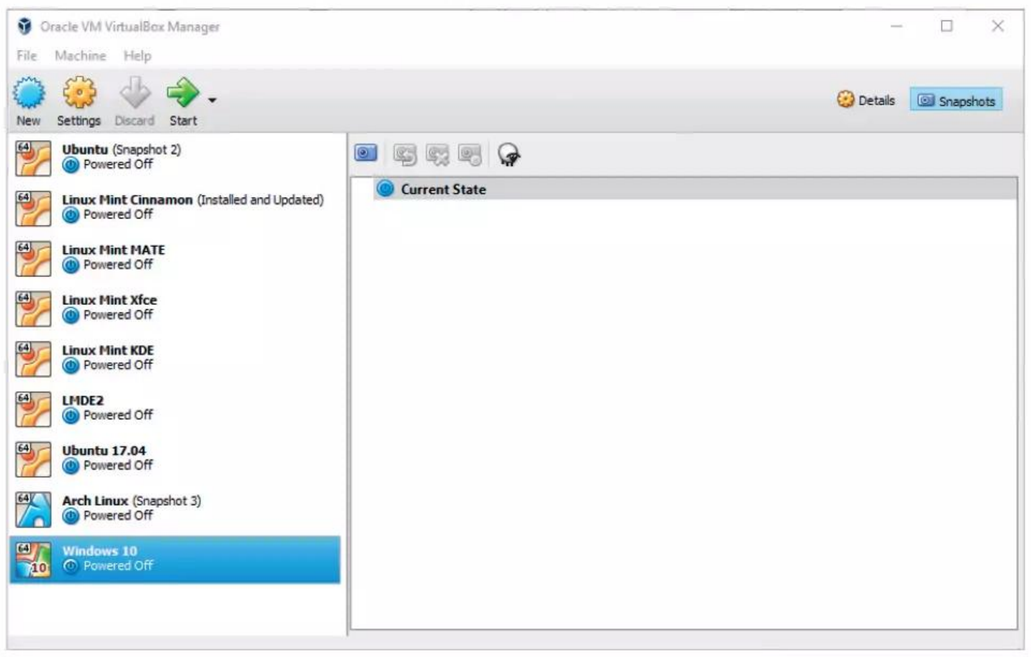
STEP 1 To begin with open VirtualBox. If it's already open, shutdown the Windows VirtualBox image you created. It's not necessary but it's often easier, to ensure the VM is closed prior to creating a snapshot.



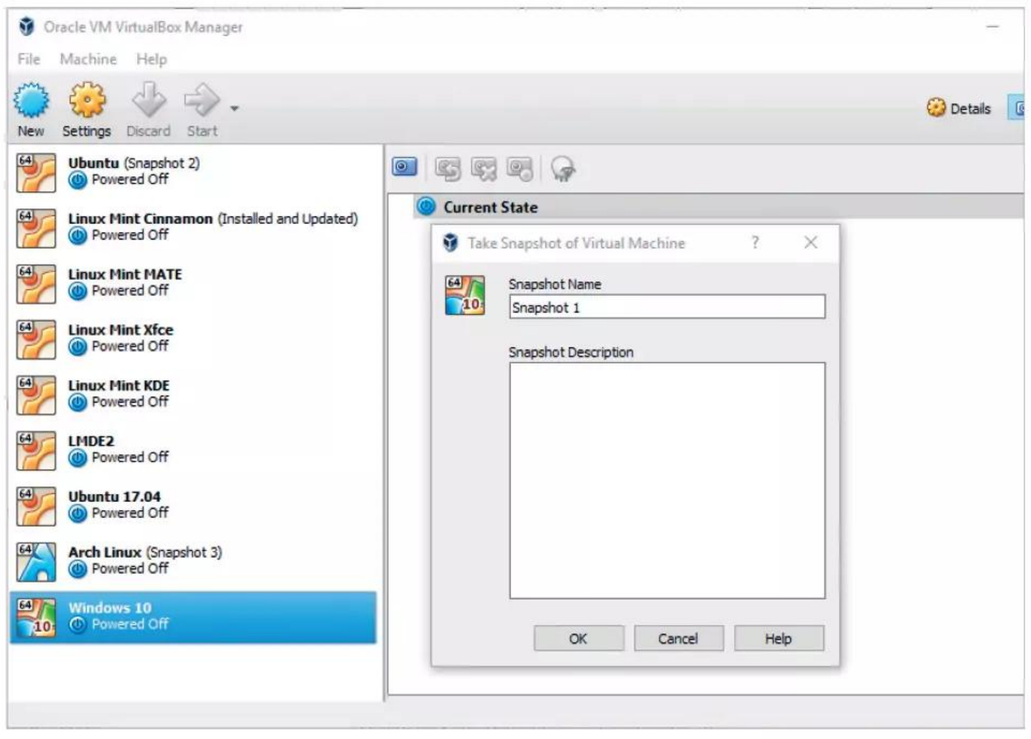
STEP 2 A Snapshot in VirtualBox is simply an image of what the virtual machine 'looked' like at the time the Snapshot was taken. You can make multiple Snapshots and revert to any whenever you wish. Snapshots taken are labelled next to the name of the VM.



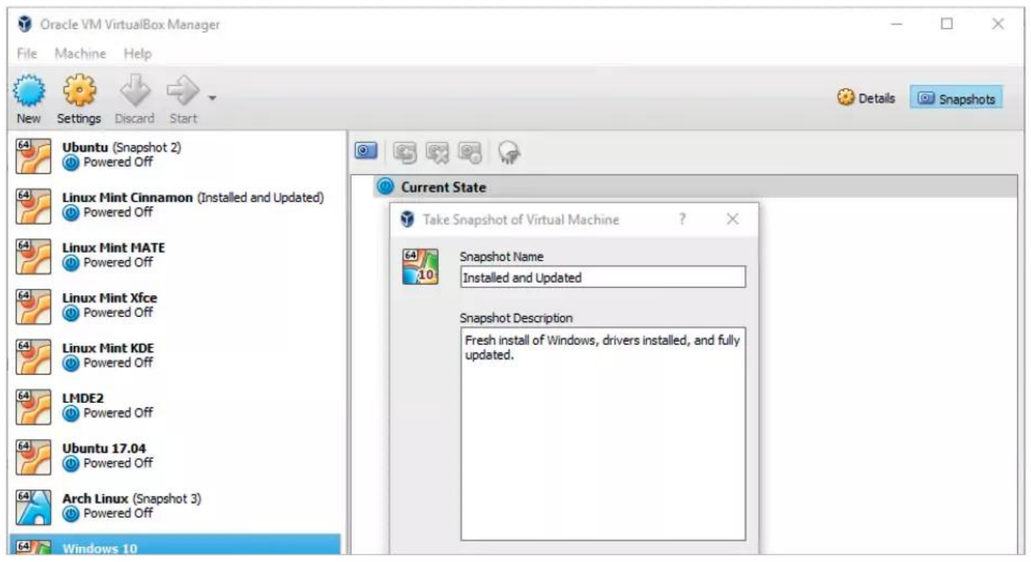
STEP 3 You can see that the state of all the virtual systems is currently Powered Off. To create a Snapshot of the Windows VM, click to highlight the system's entry in VirtualBox, then click on the Snapshots button (it's a camera icon), located to the far-right of the VirtualBox console.



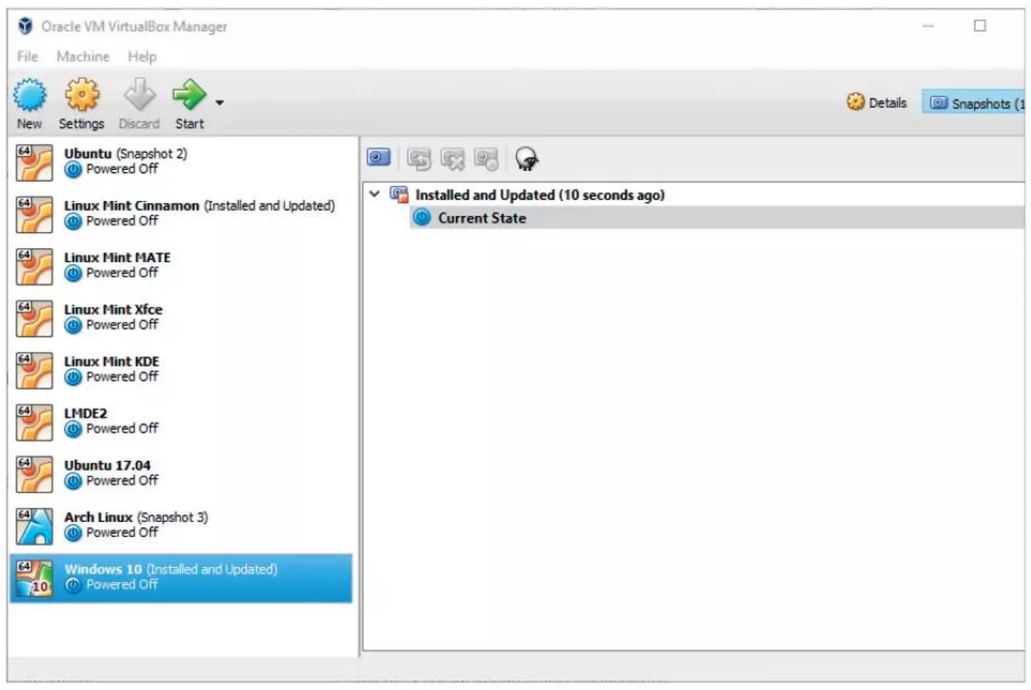
STEP 4 At present there aren't any Snapshots of Windows available. To create one, click the camera icon just above the words Current State, the icon at the opposite end of the sheep icon. This will launch the Take Snapshot of Virtual Machine console window.



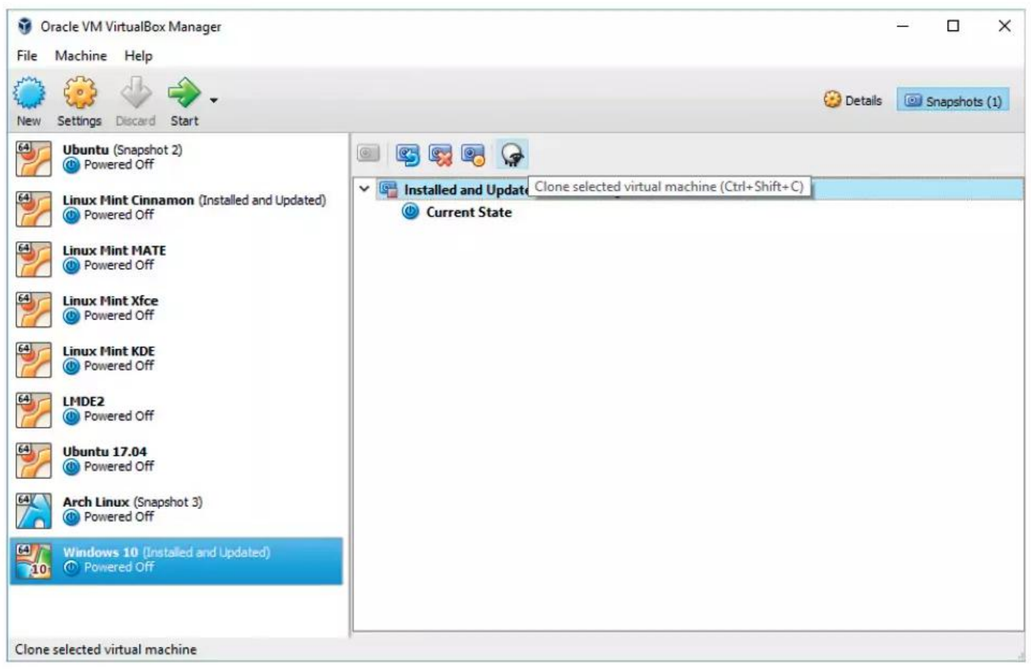
STEP 5 If you want you can name the Snapshot: Installed and Updated for example, along with a description to help identify it easier from the other Snapshots you may eventually end up making. It's not hugely important but if someone else wants to load up Windows, they know which Snapshot to go for. When you're done, click the OK button.



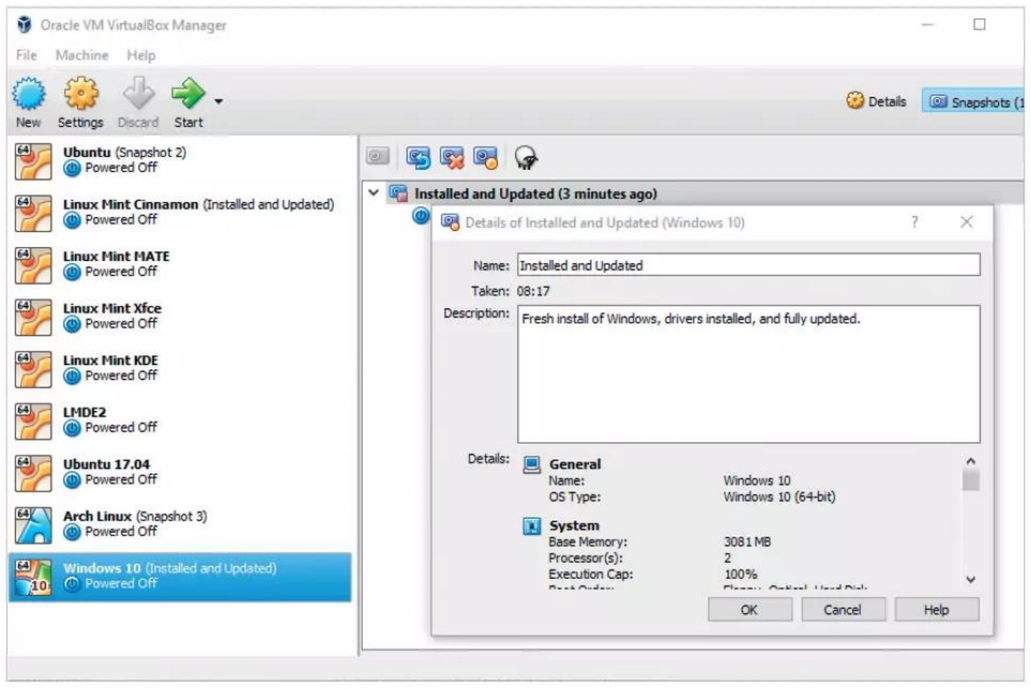
STEP 6 The process happens almost instantly and you're left with an entry in the Snapshots section detailing the named Snapshot, how long ago it was taken and a Current State entry. The Current State is literally its state when you boot it up. With it highlighted, you can take more Snapshots by using the camera icon again.



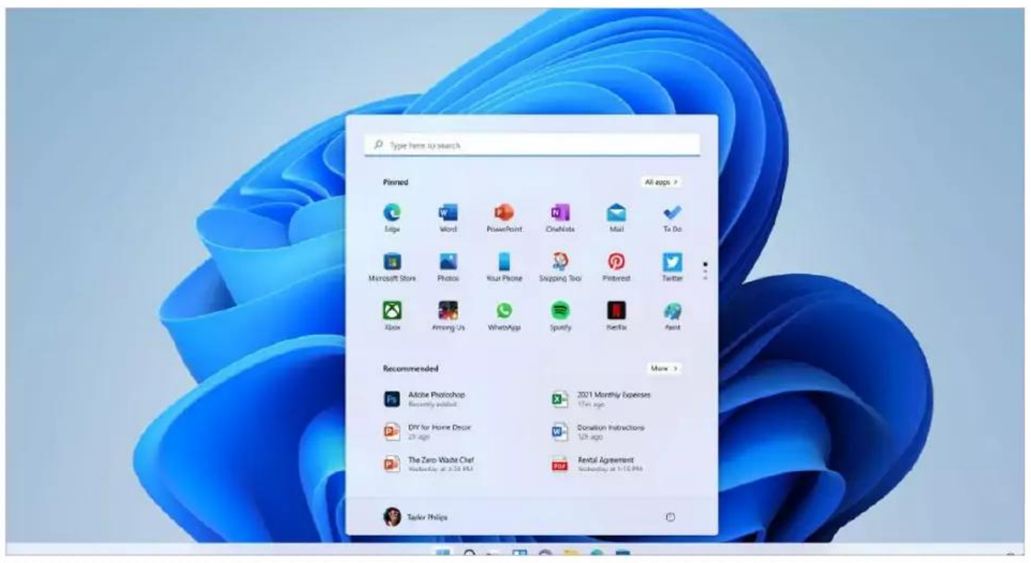
STEP 7 If you click the named Snapshot, you get more options available in the toolbar just above. Here you can Restore a selected Snapshot, if you have multiple entries. You can Delete a Snapshot and view detailed information regarding one; and with the sheep, you can Clone the current Snapshot as a new virtual machine.



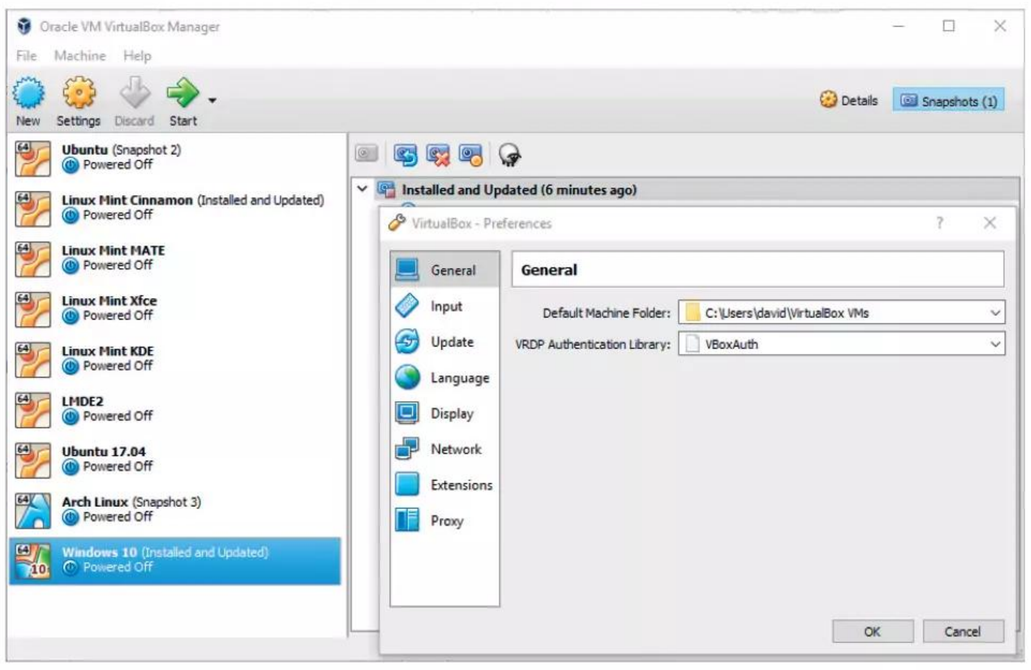
STEP 8 If you click the Details of the named virtual machine icon, the one next to the sheep, represented with an orange circle, you can view the VirtualBox settings of that particular Snapshot. This way you can assess any issues that may arise with other virtual machines; here you can see which settings worked and which didn't.



STEP 9 You shutdown the guest system, as mentioned in Step 1, but VirtualBox guest doesn't need to be shutdown in order for a Snapshot to be taken. For example, prior to installing an experimental program, click the Machine entry in the VirtualBox top menu bar and choose Take Snapshot. The process works the same way as in Steps 4 onward.



STEP 10 Each Snapshot taken can easily be reverted to, cloned, deleted and so on. However, Snapshots are stored by default in the Users/username/VirtualBox VMs folder in Windows. If you've only a limited amount of space on your C:\ drive, you may want to set the path to a bigger hard drive in the File > Preferences option in VirtualBox.



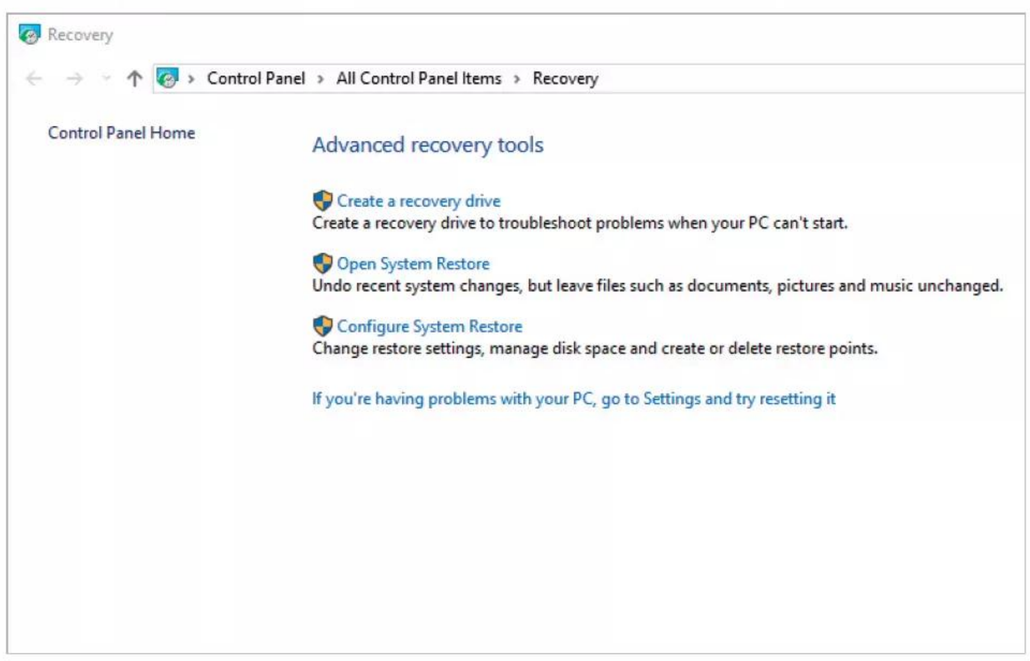
Create a Windows Recovery Drive

Since Windows 95, Microsoft has offered users the ability to create a recovery drive, which is used to help troubleshoot a Windows PC that is failing to boot, by presenting various options. If you haven't done so yet, you ideally should have created a Windows recovery drive.

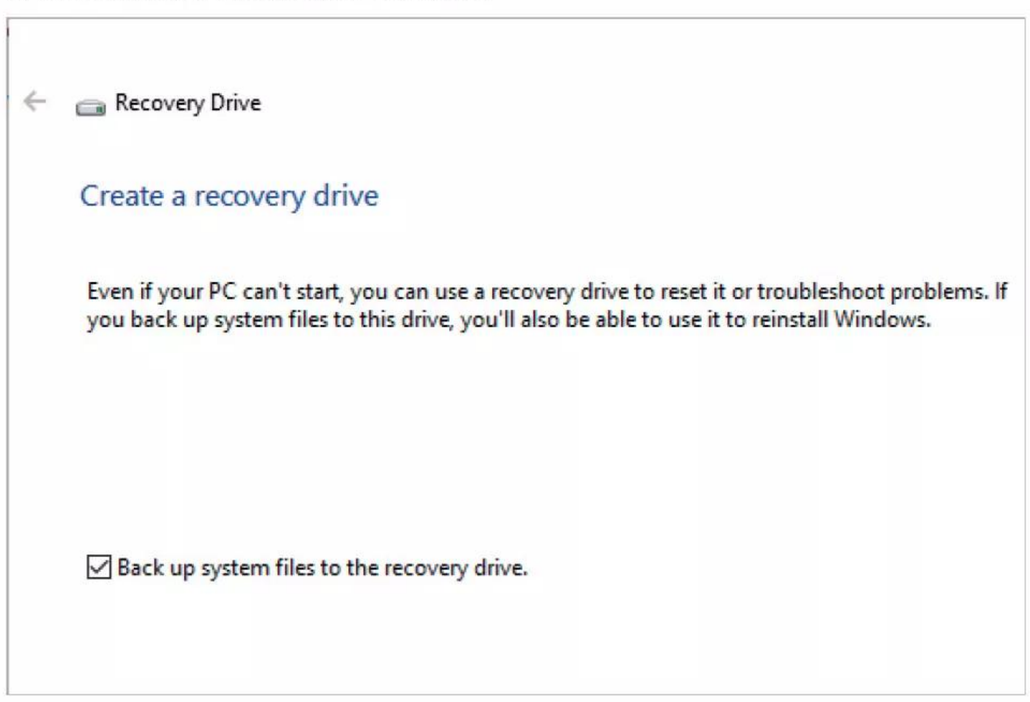
Time to Recover

You need an 8GB USB drive minimum, in order to successfully create a recovery drive. It wipes the contents off the drive and you won't be able to use it for anything else, so make sure it's labelled and stored in a safe place.

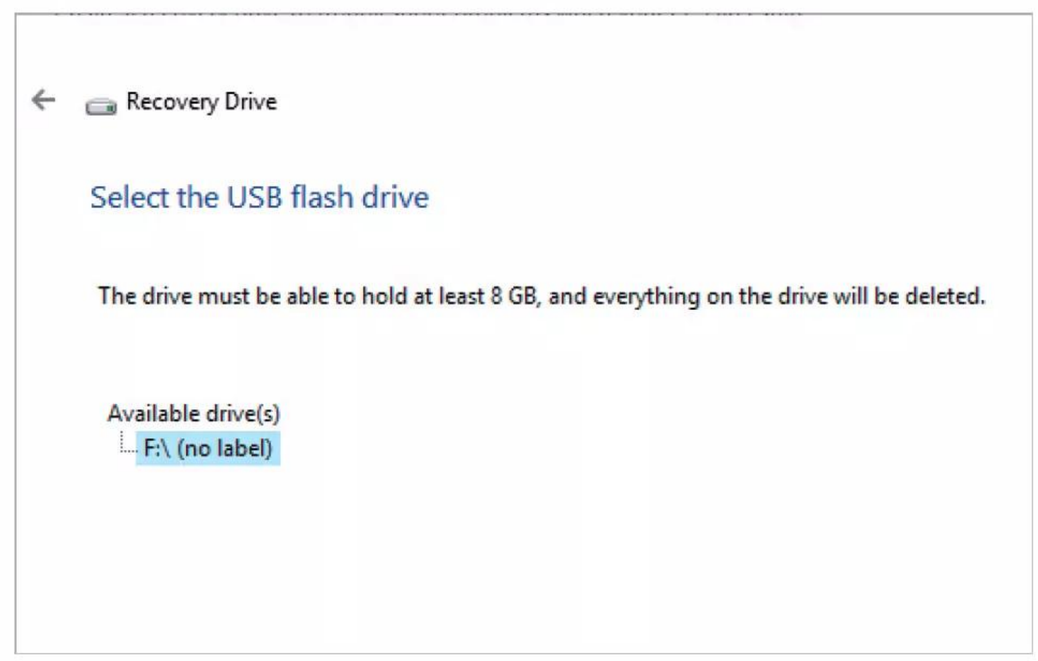
STEP 1 Insert the USB drive into your PC and close the Explorer window that opens upon insertion. Click the Windows Start button and type recovery, then click on the Recovery Control Panel. In here you can see several options available; you want the first, Create a recovery drive.



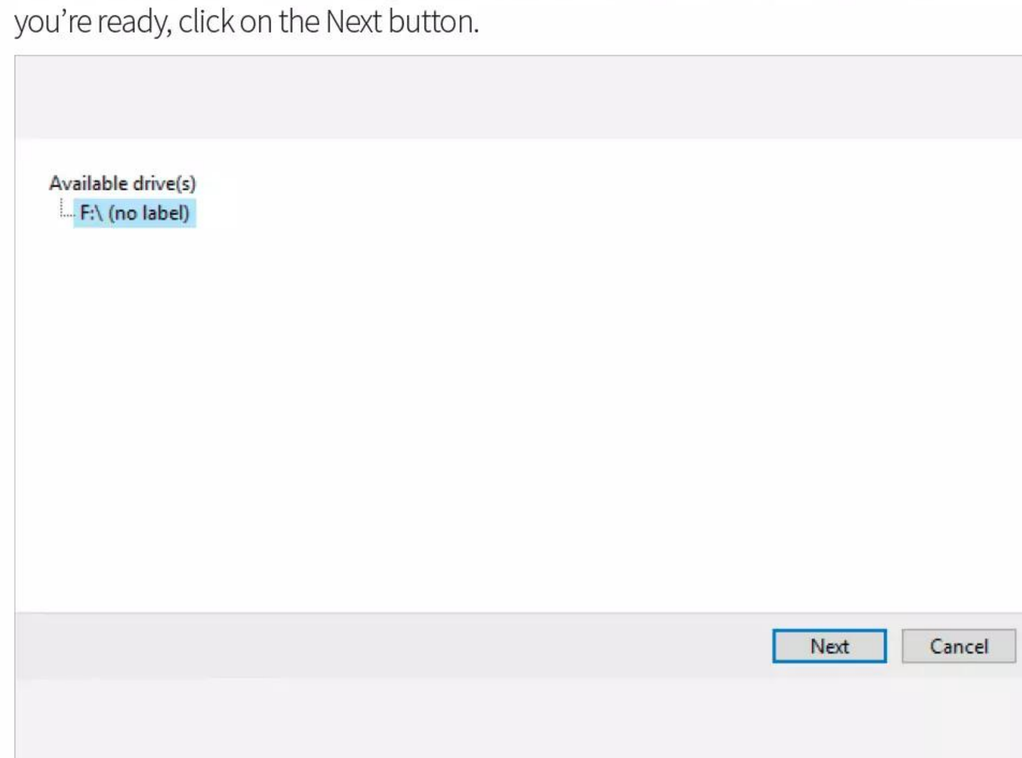
STEP 2 Click the Create a recovery drive link and accept the UAC authentication message that pops up. First, there's the option to backup any important system files to the recovery drive, alongside the usual recovery options. This is a good idea as it can replace these vital files in the event of a boot failure. Click Next to continue.



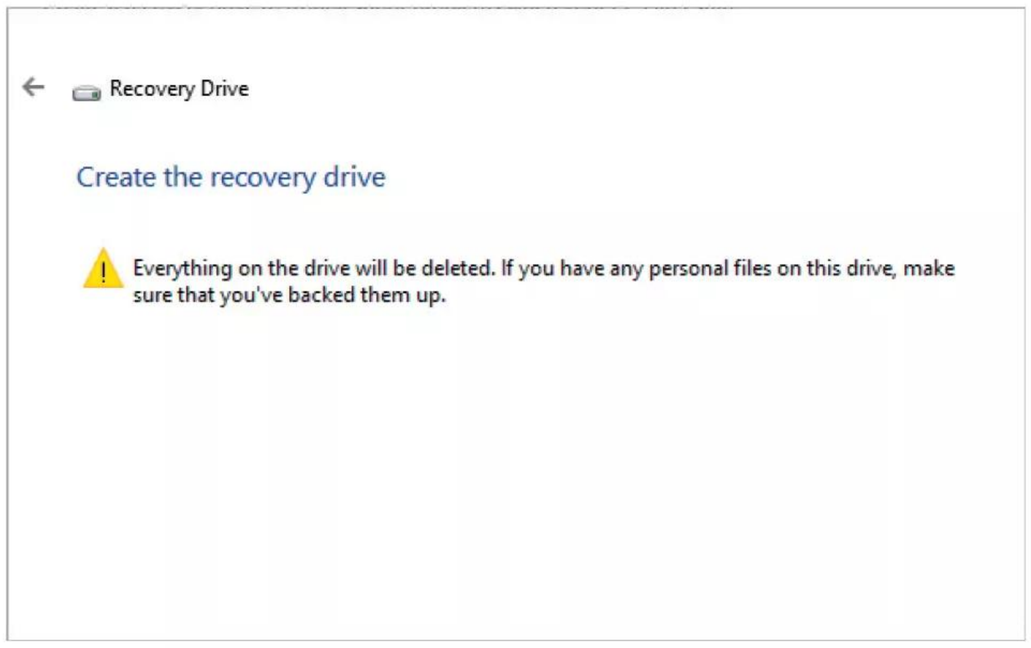
STEP 3 There's a short wait as Windows analyses the available locations where it can install and create the recovery drive. Eventually, providing you inserted the 8GB plus USB stick prior to starting the process, you're asked to select the destination from those Windows has discovered.



STEP 4 In the example we have here, there's just one possible location, the F:\ drive. If you have more than one possible destination available, make sure that you're selecting the correct USB drive for your recovery drive. When you're ready, click on the Next button.



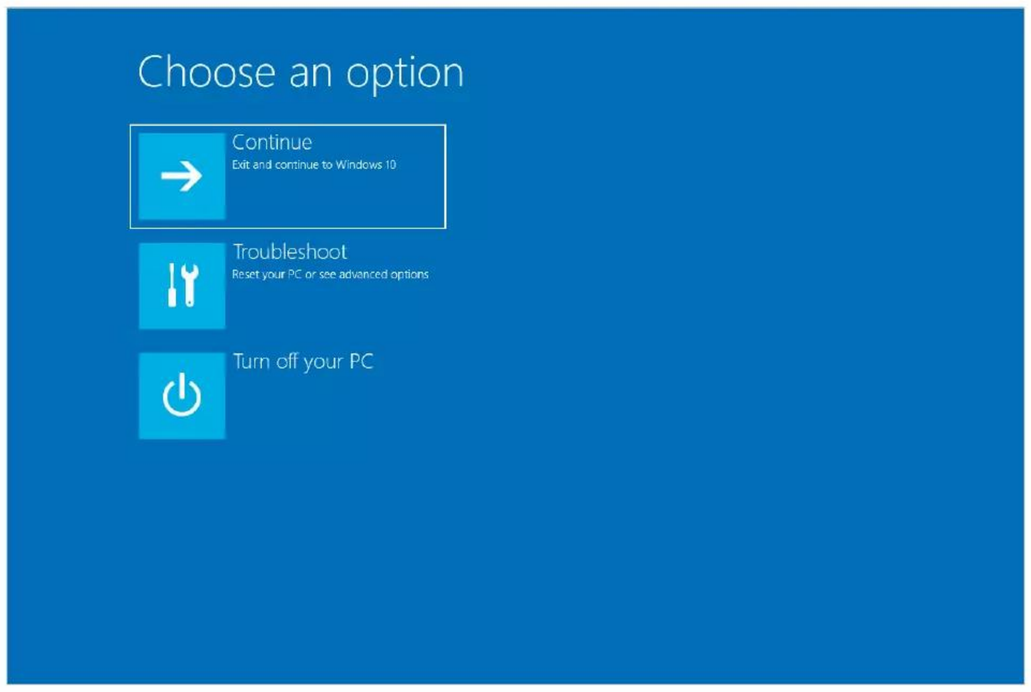
STEP 5 Before committing to creating the recovery drive, Windows will offer one final warning. Remember, everything that's currently on the USB stick you chose as the recovery drive will be erased during the process of creating the drive. If you have any files stored on it, make sure they're backed up to another location.



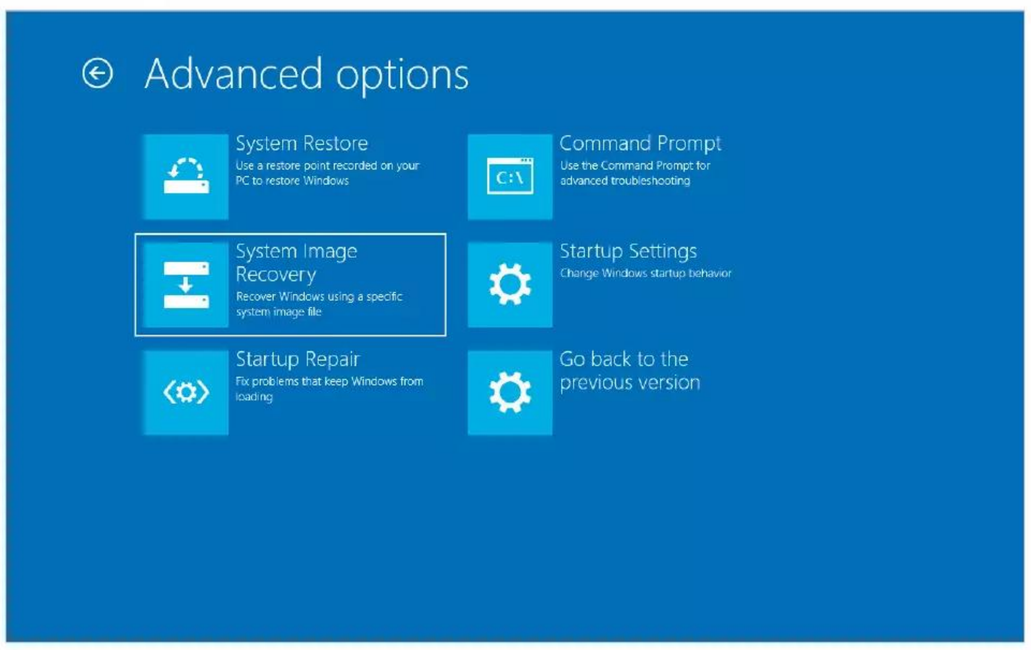
STEP 6 When you're ready click on the Create button to start the process. It may take some time, depending on the speed of the USB stick used, as Windows prepares, formats and copies the utilities and files over to the USB recovery drive.

STEP 7 When the process is complete, you receive a recovery drive is ready message. The only option available to you is to click the Finish button. This will close the recovery drive window and return you to the Recovery console.

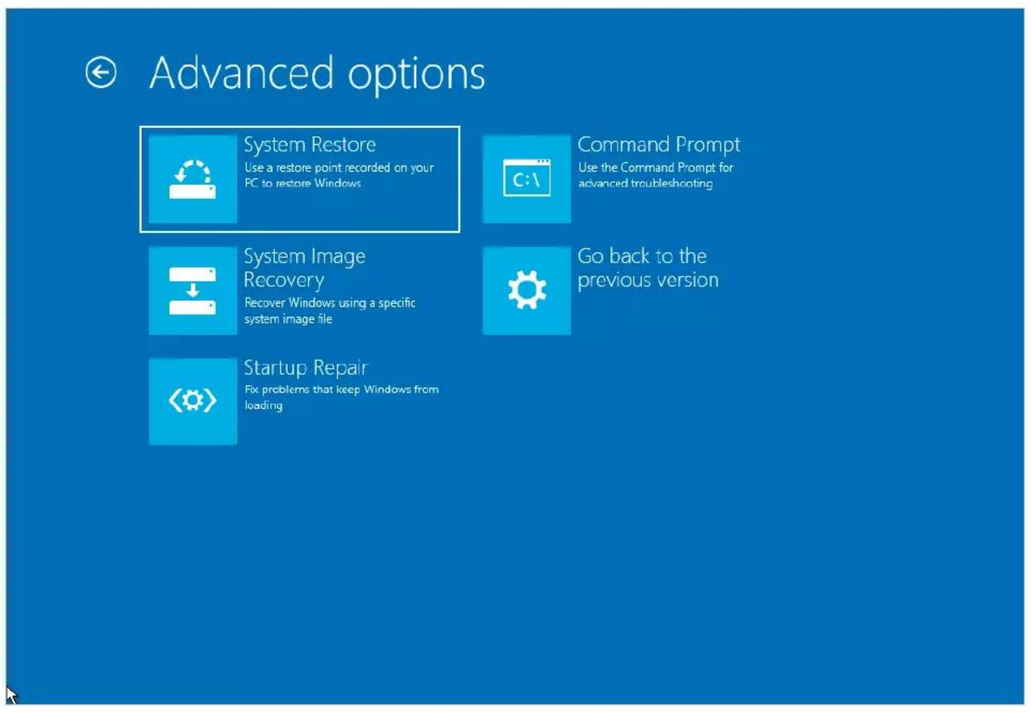
STEP 8 Store the drive in a safe place, as it can restore vital system files should anything ever go wrong with your system and leave it unable to boot. Should something go wrong, you see the Windows safe mode boot options when you try and power up your computer.



STEP 9 From the safe mode boot options, choose the Troubleshoot tile followed by Advanced Options. From there you can choose the System Restore and System Image Recovery options along with your rescue drive to help you recover Windows.



STEP 10 Alternatively, set the BIOS to boot to the newly created recovery drive and follow the onscreen instructions to launch the recovery method. Start by choosing your language, then select the Troubleshoot option and then opt for one of several recovery options.



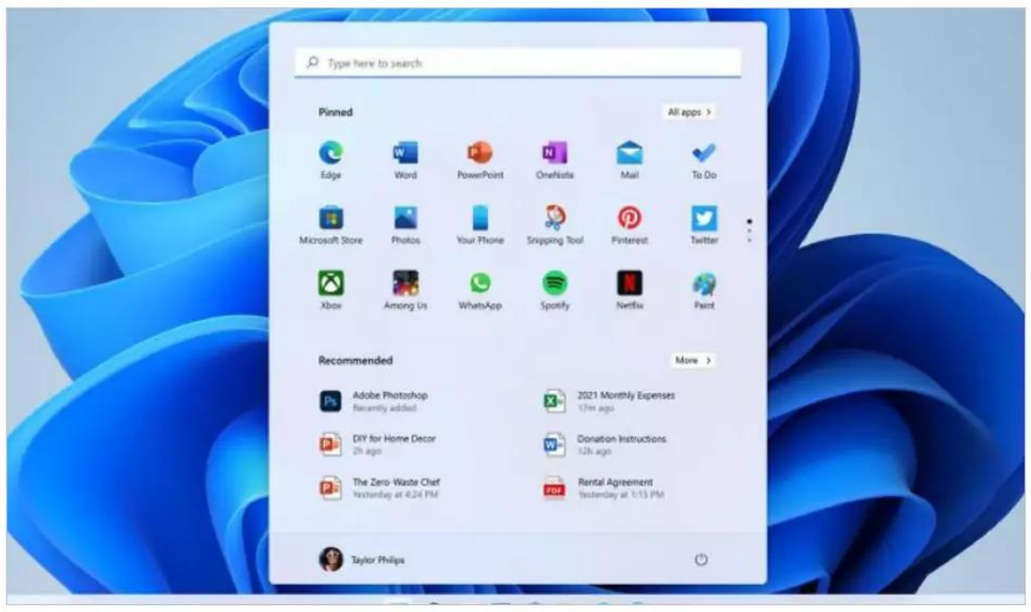
How to Back Up Windows

Even with the greatest possible cyber protection in the world guarding your computer, there's still a chance something could go wrong. It might not even be malware-related; a broken hard drive or other component can cause as much grief. Therefore, you need a good backup.

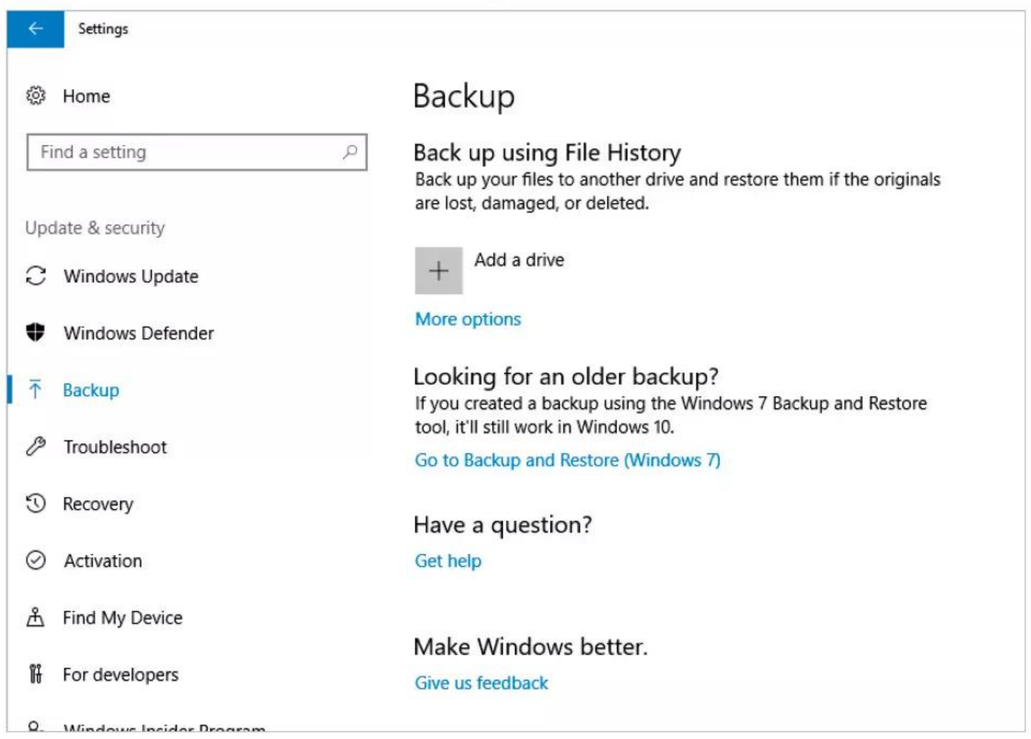
Backing Up

Computers are unpredictable beasts, so you need to make sure that all your files and important data are securely backed up and more importantly, you're able to restore them easily. Thankfully, it's a straightforward process.

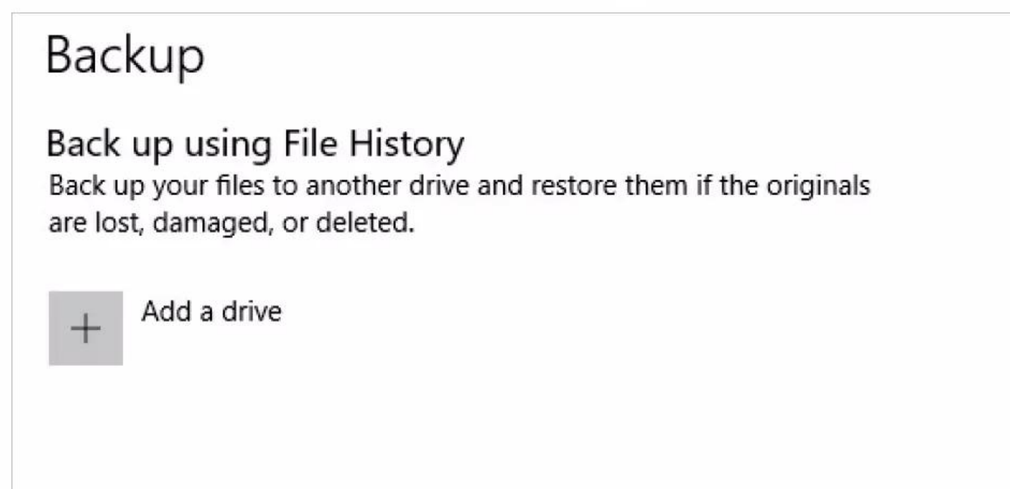
STEP 1 Windows has, since its early days, featured some form of backup tool. Windows was launched with the File History backup tool, which is a simple to use tool to ensure stable and regular backups of important files are made. Start by clicking on the Windows Start button and selecting Settings from the menu.



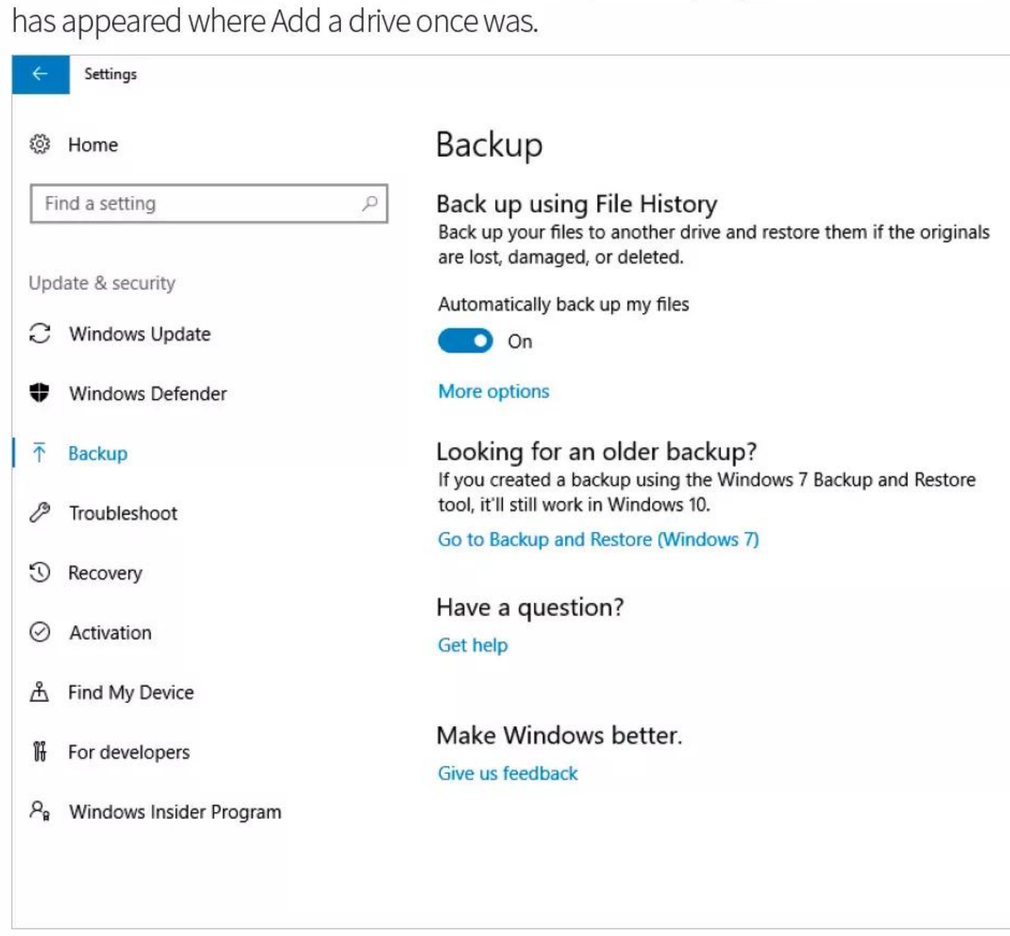
STEP 2 Once in the Settings console, click on the Update & Security icon, followed by the Backup option from the menu on the left. You can see a number of possible options before you: Add a Drive, More options, Go to Backup and Restore (Windows 7), along with help and feedback links.



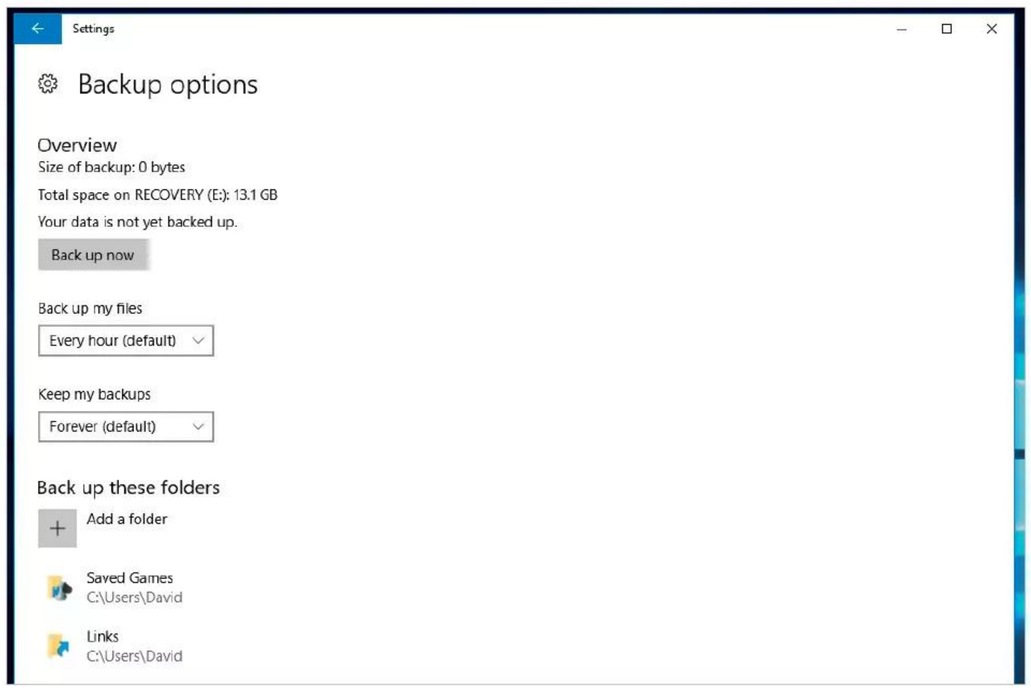
STEP 3 Ideally you need to insert a reasonably sized USB stick or use a second hard drive in your computer. If you have a USB stick, insert it now, or if you own a second hard drive power off the computer and install it and boot back into Windows. Once done, click the Add a Drive icon.



STEP 4 Windows will search for any capable drives on to which it's able to back up your files. When your drive or USB device is displayed, click the drive link. Notice that an 'Automatically back up my files' switch button has appeared where Add a drive once was.

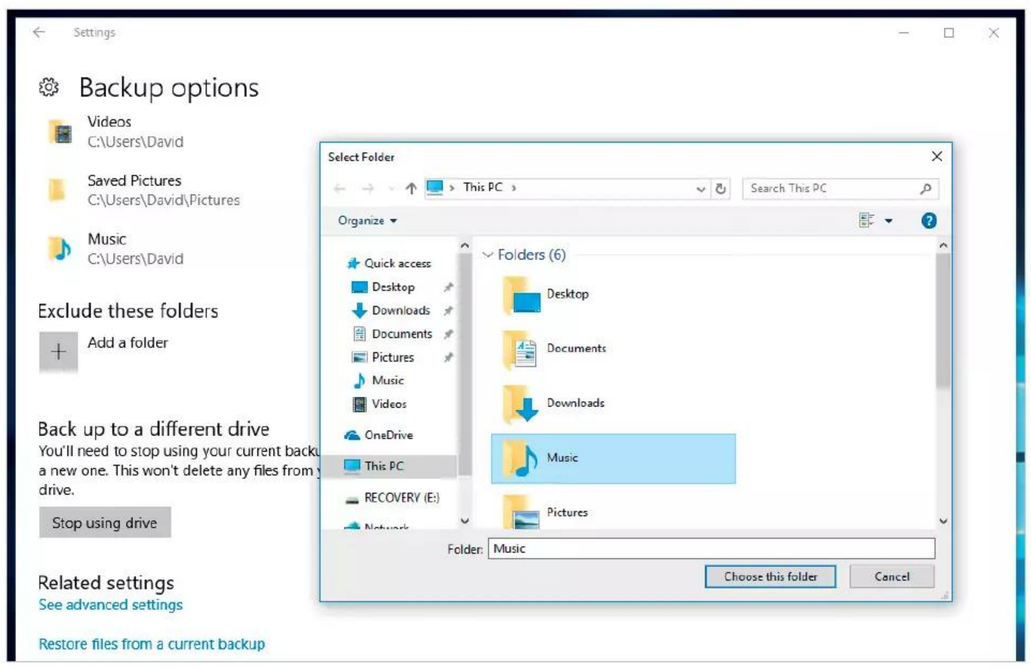


STEP 5 From here, click on the More Options link that's under the switch button, this will open the Backup Options console. This section details the backup schedule, the location and which folders will be included in the backup; and for how long Windows will retain your backed up files.

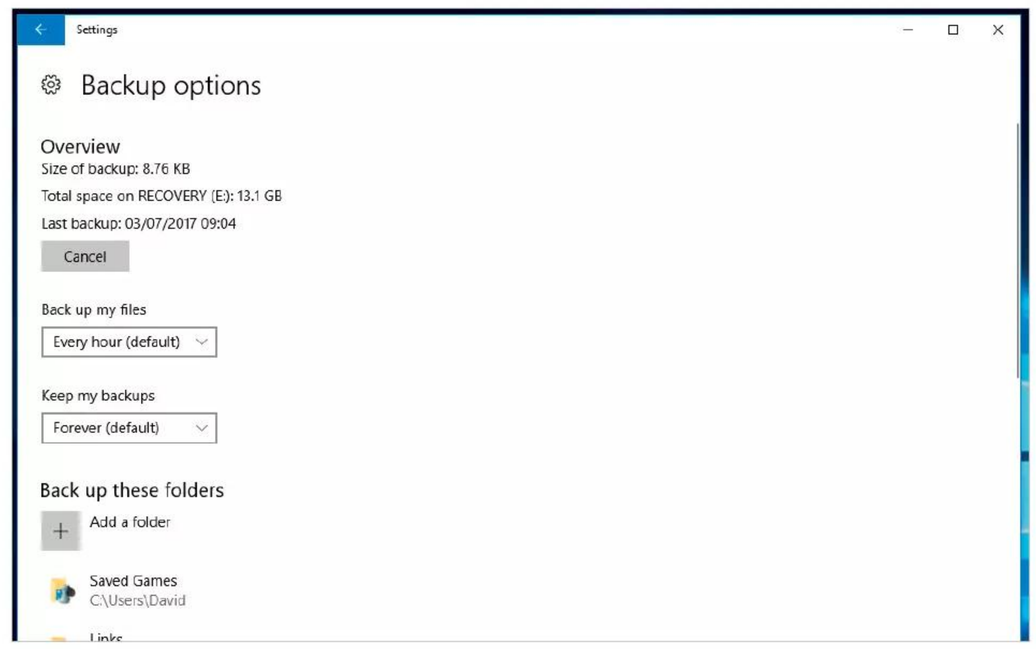


STEP 6 If you scroll down through the Backup Options console, you can see that the entirety of your user folder within Windows has been added by default. This includes the Music and Videos folders, as well as Searches, Camera Roll, Contacts, Favourites and so on.

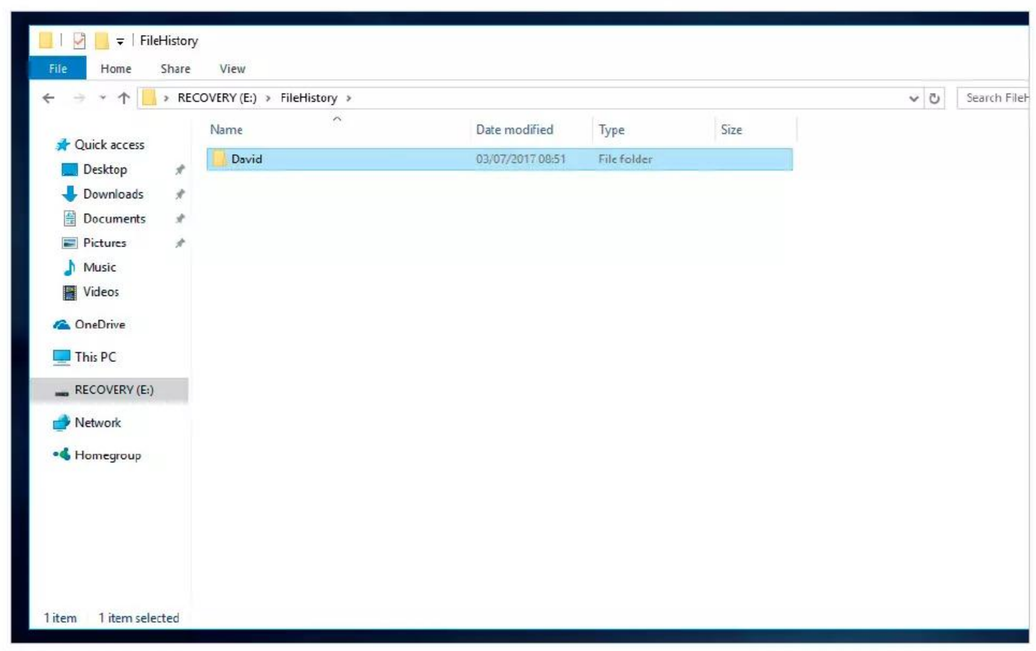
STEP 7 At the bottom of the console window you have the options to stop using the selected drive and to Exclude any folders from the default. If you don't want to back up folders for Music, Videos etc., click Add a folder on the Exclude these folders icon, then pick the folder to exclude and click the Choose this folder button.



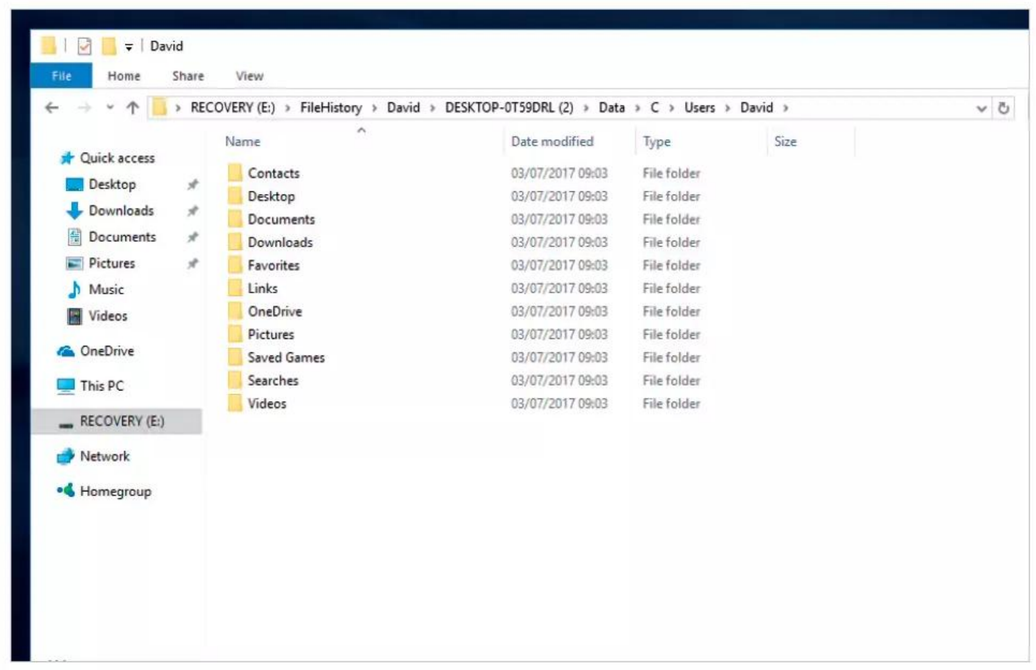
STEP 8 When you're ready to start backing up, you can click the Back up now button to the top of the Backup Option console window. Alternatively, you can wait for an hour when the default schedule kicks in. Obviously, depending on the size of the files within your backup folders this could take some time.



STEP 9 The backed up files will be stored on the chosen backup drive, within a folder called FileHistory. Inside that folder will be the specific user folder, so if you use File History backups for more than one user, their user names will be listed here too.



STEP 10 Drilling deeper into the folder layers reveals more default folders, containing important XML data that Windows uses to store the chosen options. You can find the actual files that have been backed up in the Data folder, laid out in the same folder structure as on your system, i.e. C > Users > Name > Documents etc.



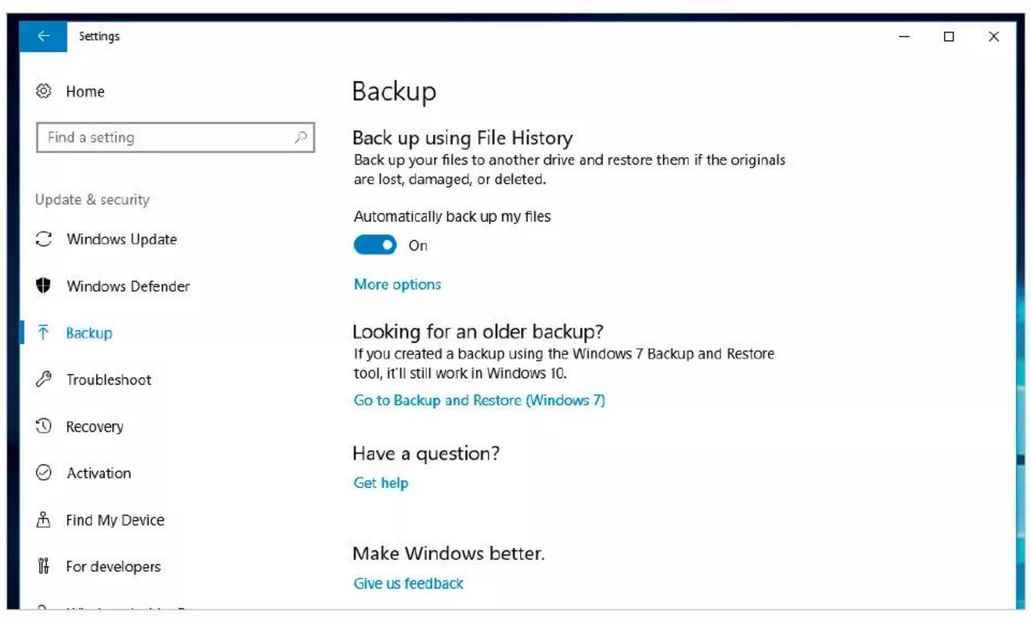
How to Create a Windows System Image

Backing up your files is perfectly fine but in the event of having to wipe your hard drive and start again, getting everything back in order can be time consuming. However, creating a system image means you can almost instantly restore the entire system without needing to rebuild Windows.

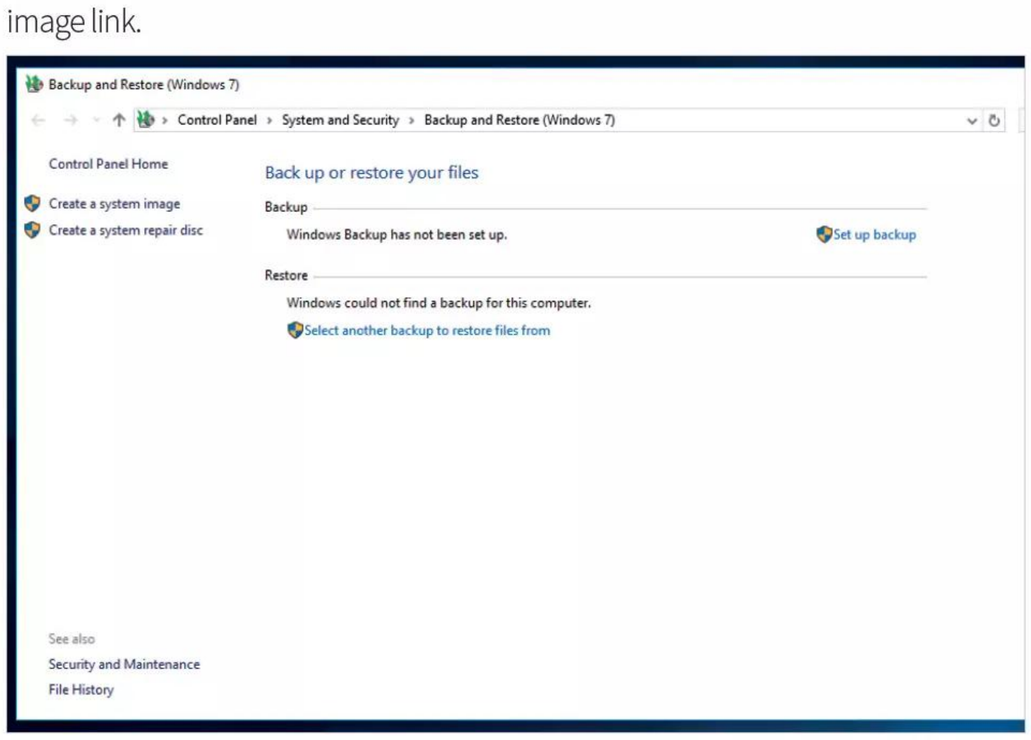
System Imaging

A system image works in much the same way as the VirtualBox Snapshots. You're essentially taking a snapshot of your entire system, which can then be restored quickly. Saving you having to reinstall Windows, all your programs and data.

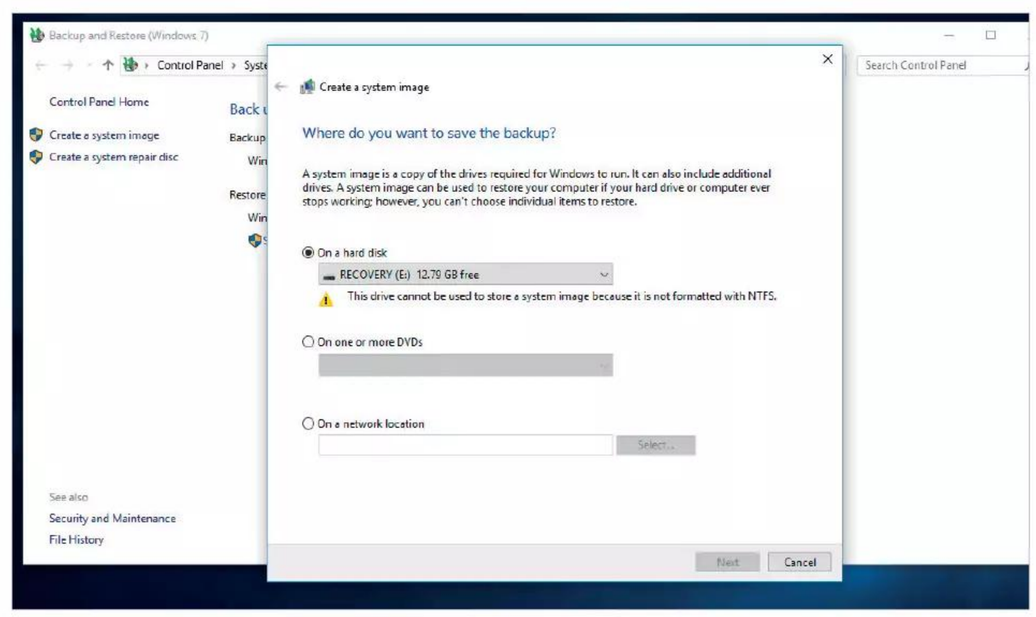
STEP 1 To begin, click on the Windows Start button and once more navigate to Settings > Update & Security > Backup. From within the Backup console window, where you were in the previous tutorial, click on the Go to Backup and Restore (Windows 7) link under the Looking for an older backup section.



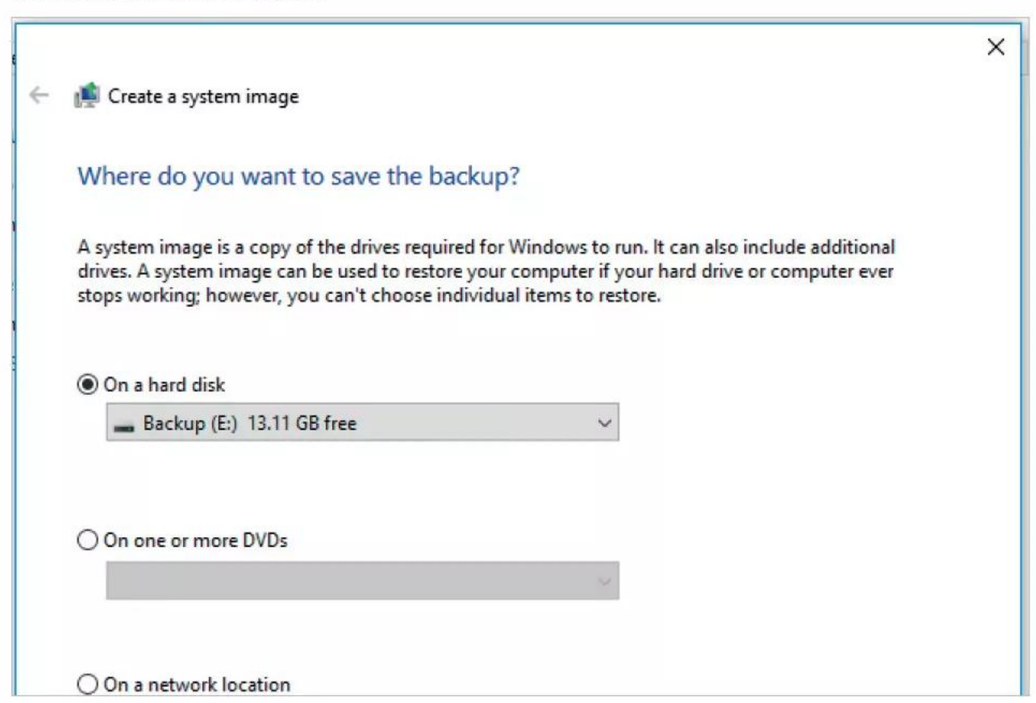
STEP 2 This will launch a new window, the Backup and Restore (Windows 7) console. Microsoft has kept this feature intact through Windows 8.1 and 10 purely due to compatibility support for backups done under older versions of the OS. To the left there are two links, click on the Create a system image link.



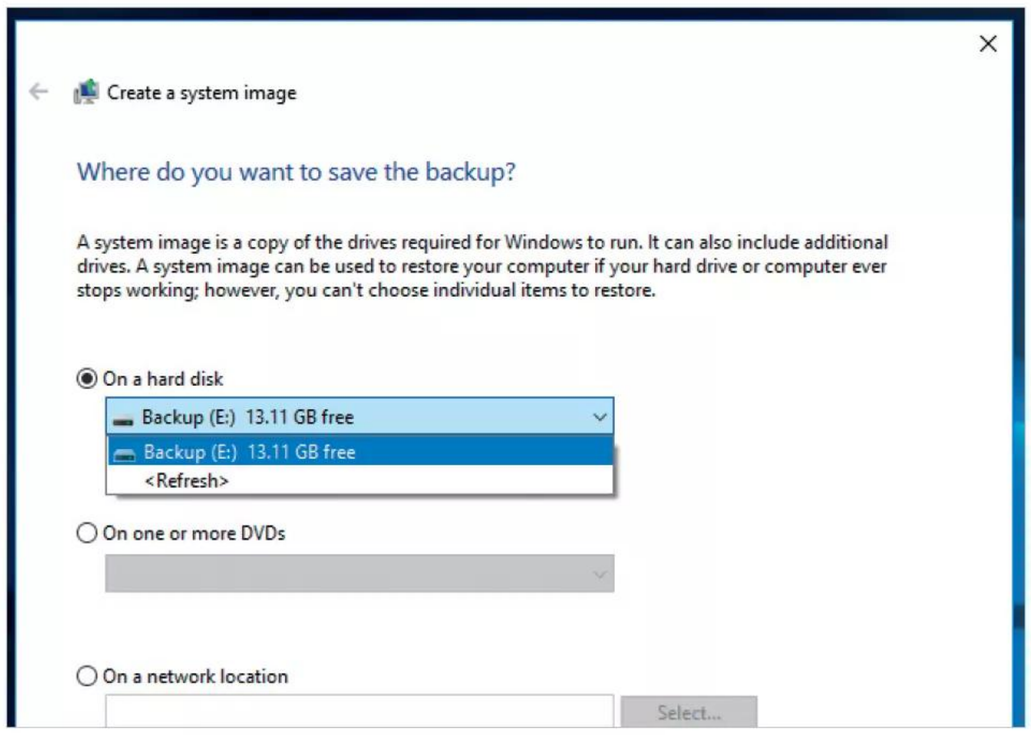
STEP 3 Windows will now scan your system for a drive that is able to house the system image files. You may need to make some changes to any drives according to what messages you get back from the scan. In this example, the drive we're using needs to be formatted as NTFS before Windows can use it.



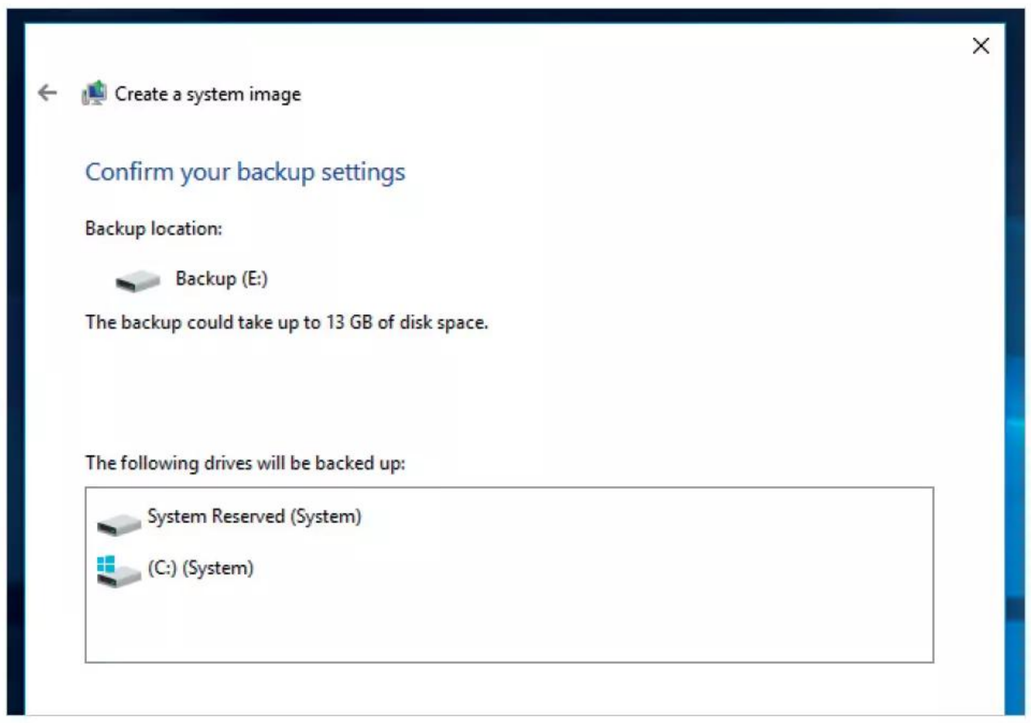
STEP 4 Providing you've met the requirements, you're offered a choice of where the system image can be written to. A drive is the quickest solution when it comes to restoring the image but you can opt for DVDs; it depends on the size of the image as to how many DVDs you need. You can even select a network location.



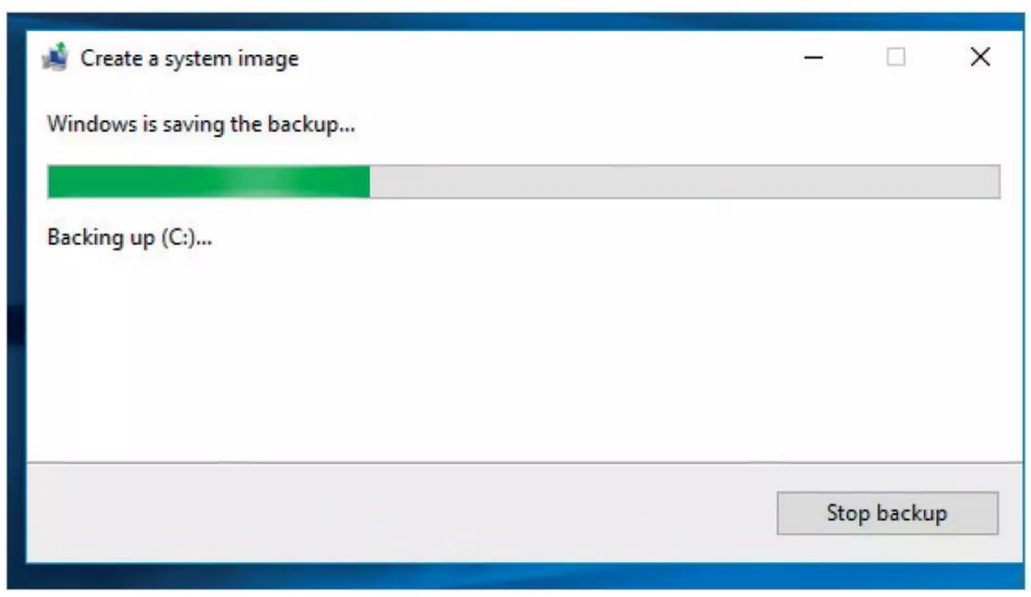
STEP 5 For this example, let's use an internal second hard drive. Make sure that the correct drive (it could be a high capacity USB stick or even portable USB hard drive) is selected, then click the Next button to continue.



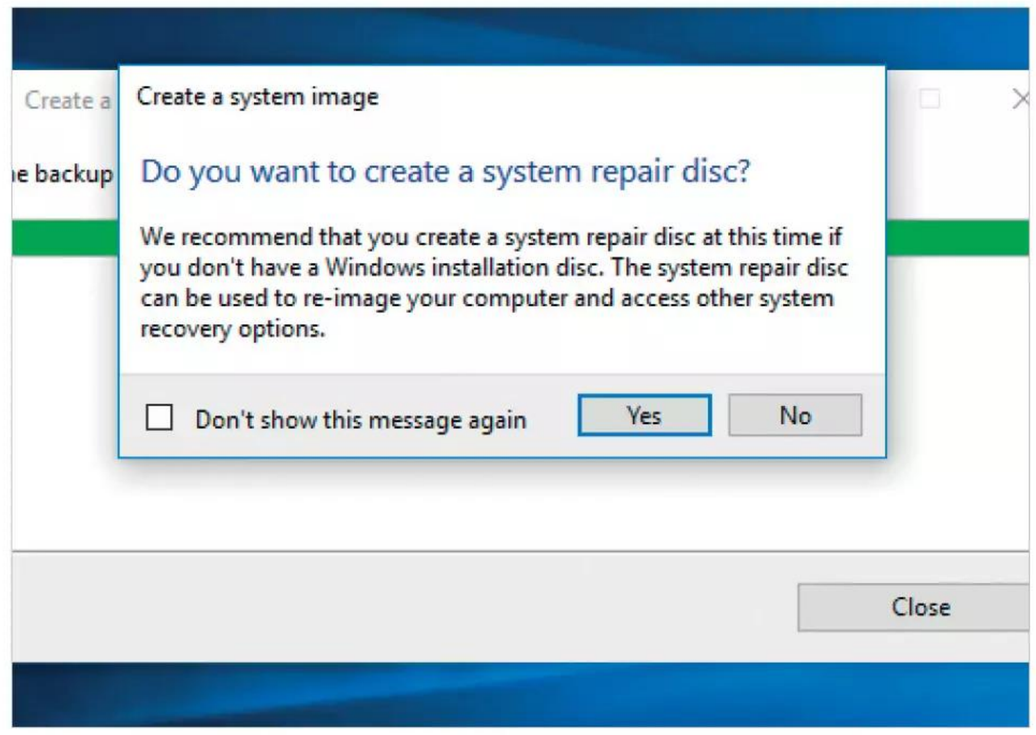
STEP 6 The next window will display the drives that are included in the system imaging process. In this example, the C:\ drive, the system drive and the System Reserved partition are to be backed up. When it comes to restoring the system you'll need both partitions for Windows to be able to boot up correctly.



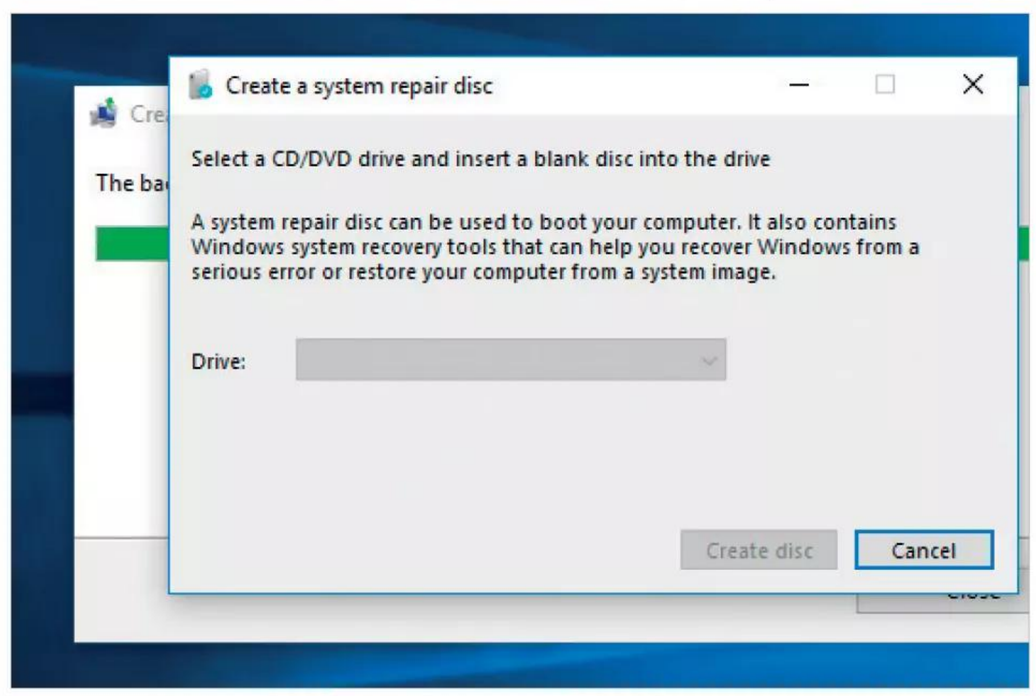
STEP 7 When you're ready to continue, click the Start Backup button. This will begin the imaging process, which can take some time depending on the amount of space used on the C:\ drive and the speed of the drive you're writing to. Allocate ample time if you're writing to DVD.



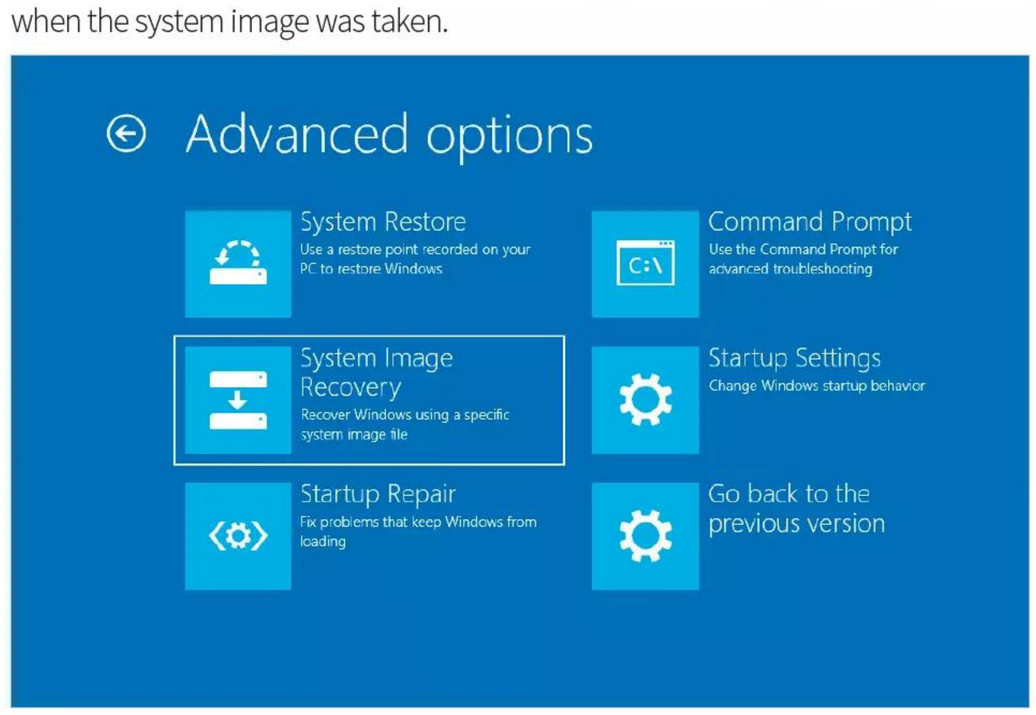
STEP 8 Once the process is complete, Windows will ask you to create a System Repair Disc. This disc will allow you to boot into the environment where you are able to launch the system image restore.



STEP 9 If you click Yes to creating the System Repair Disc you need to make sure you have a blank DVD to hand. Follow the on-screen instructions and click on the Create Disc button to burn the repair files to the disc.



STEP 10 Should you need to restore Windows from the system image, you can boot into the System Repair Disc and select the System Image Recovery option from within the Advanced Options of the Trouble Shoot menu. Follow the instructions and within minutes Windows will be back as it was when the system image was taken.



Extreme Windows Lockdown Tips

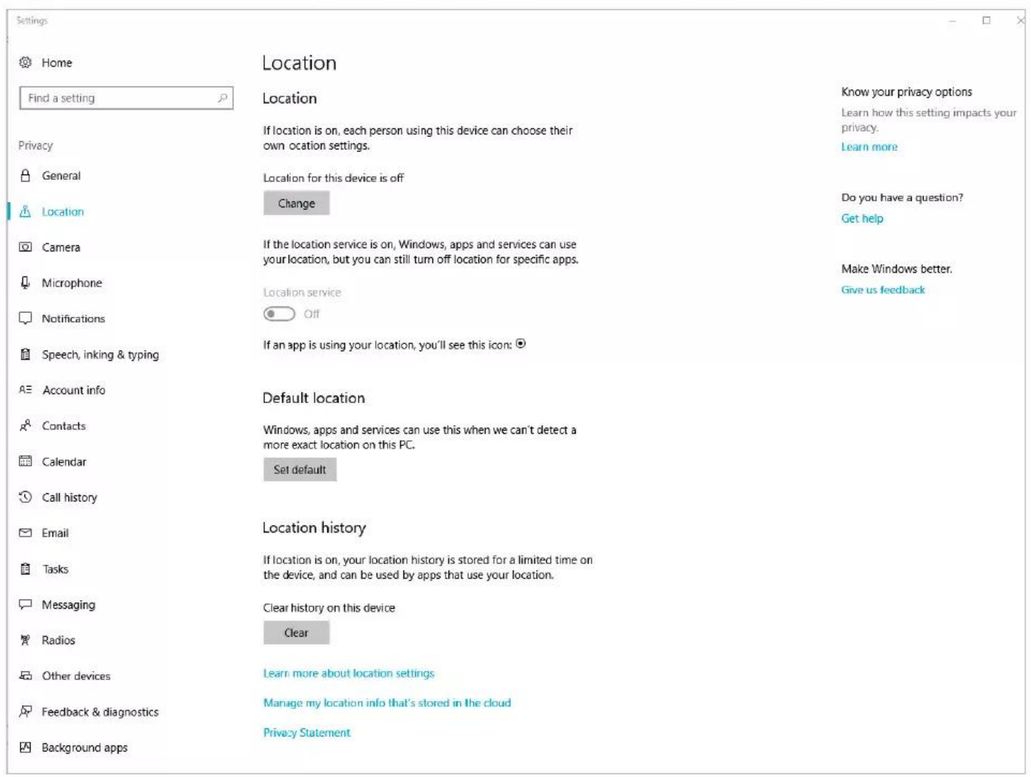
There are numerous ways and means to greatly improve Windows's security and privacy. Precisely how secure and private you want to get is purely down to you. You can opt for better than average or through these tips below, absolute extreme security.

Windows Security: The Paranoid's Guide

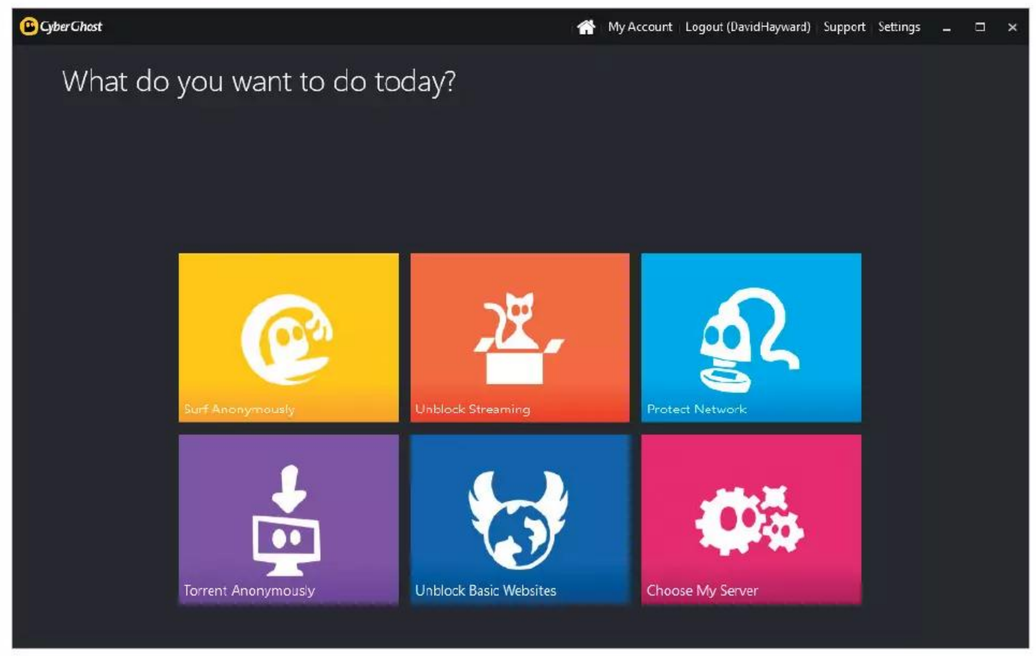
If you're fanatical about securing Windows and locking it down to the point where the NSA would be impressed, then follow these top ten extreme lockdown tips.

TIP 1 Let's begin with the easiest tip, unplug the computer from the Internet. Naturally there are disadvantages to this and you won't get updates for Windows or programs. However, you certainly won't get any Internet-borne malware infecting your machine.

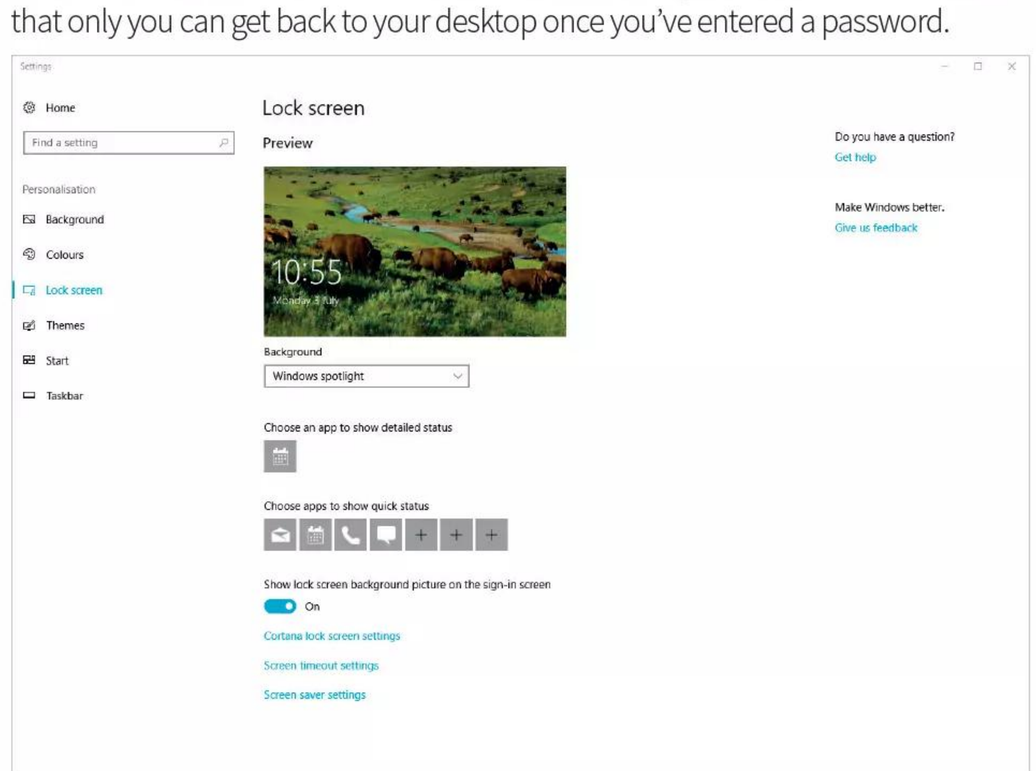
TIP 2 Click the Windows Start button and type privacy into the search box. Open the Privacy Settings link and turn off every option within the eighteen available Privacy sub-categories to the left of the console window.



TIP 3 When online use a VPN and where possible, also use the Tor browser. Both of these combined will greatly improve your anonymity and improve security by utilising the site blocking and anti-scamming properties of a good VPN such as CyberGhost.

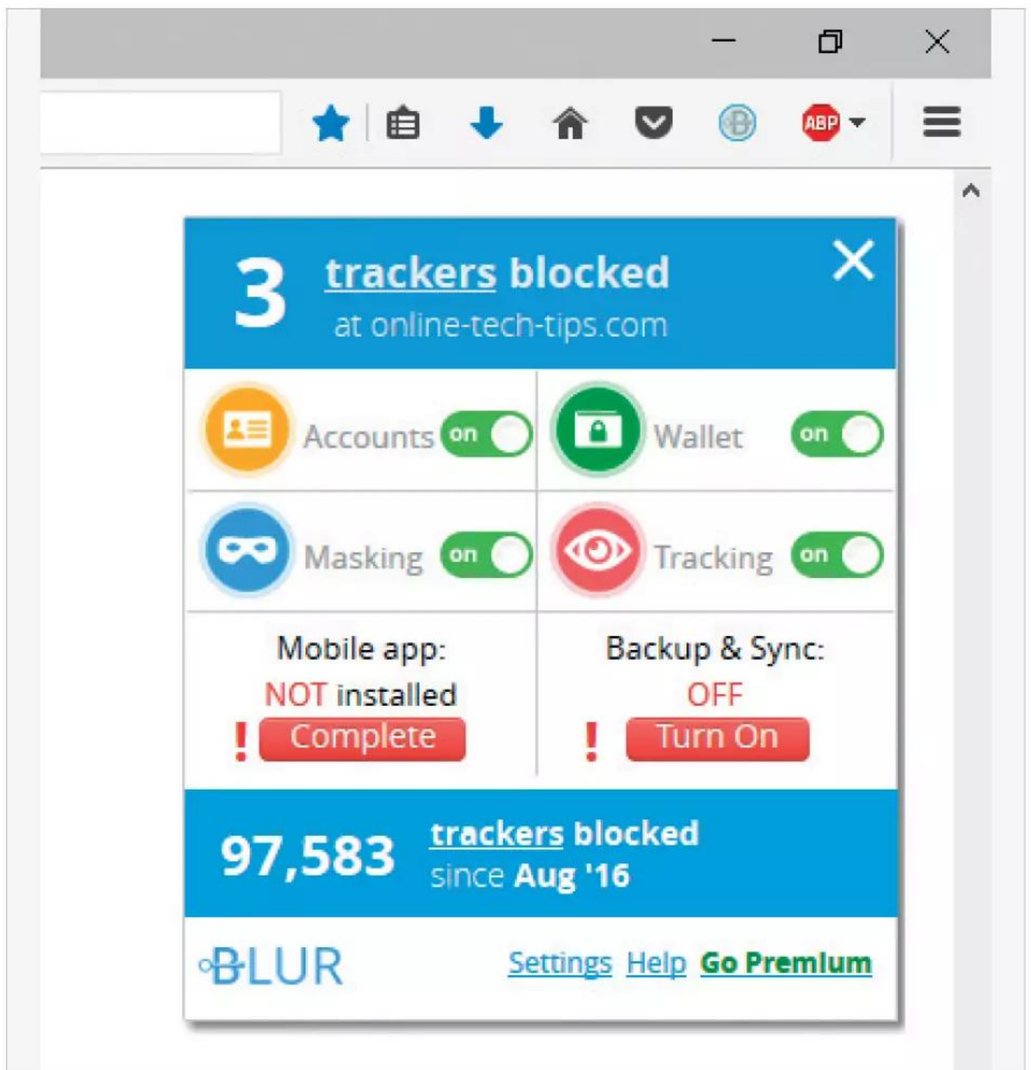


TIP 4 If you step away from your computer on regular intervals, you need to make sure that no one will be able to get on to it. From the Windows Start button type lock and click the Lock Screen Settings link. In here set a lock so that only you can get back to your desktop once you've entered a password.

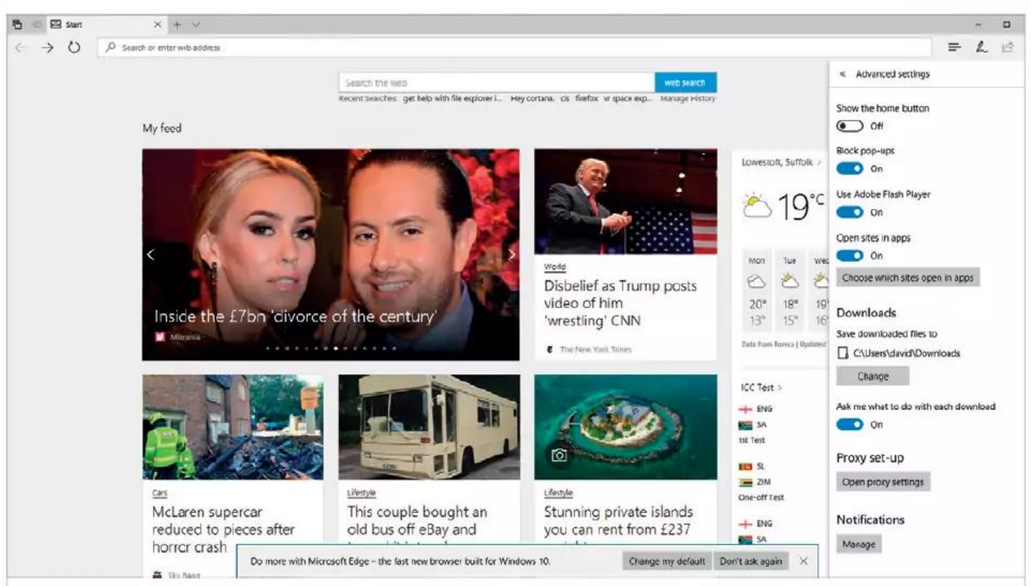


TIP 5 Depending on the age of your computer, it's possible to create a boot password from the BIOS. You need to consult your motherboard manual as to how to accomplish this but you can set a password for being able to boot into your computer (before Windows even starts) and getting into the BIOS itself.

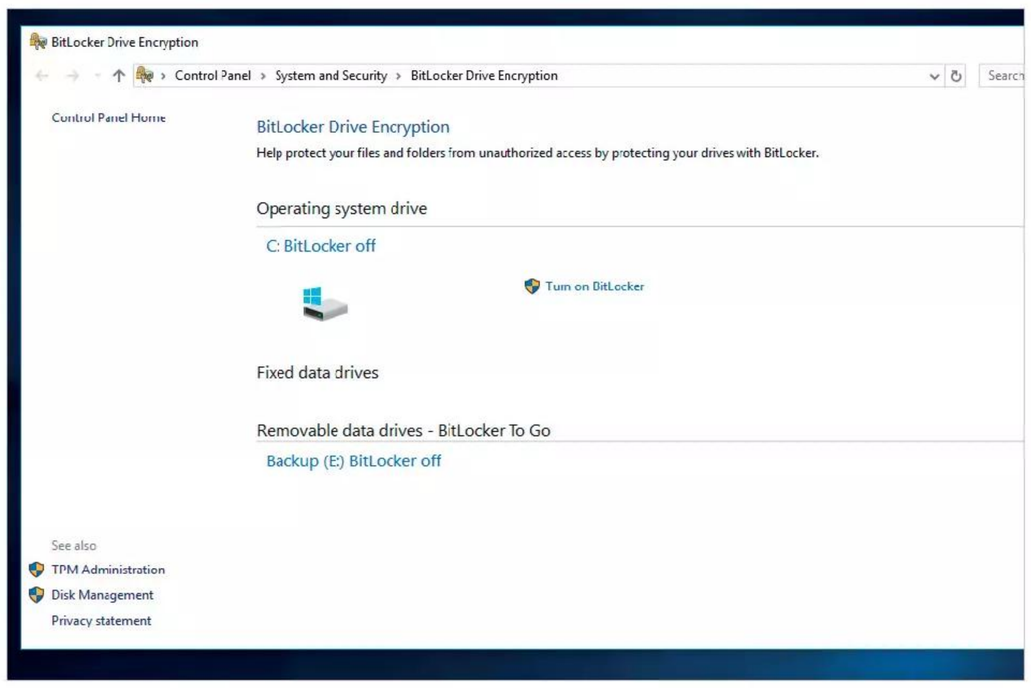
TIP 6 Consider installing several add-ons to your browser to improve its security and prevent any unwanted data miners or rogue scripts from being executed. Adblock Plus, Blur, No Script and other examples will secure your browsing session. For an extreme route, use the Tor browser.



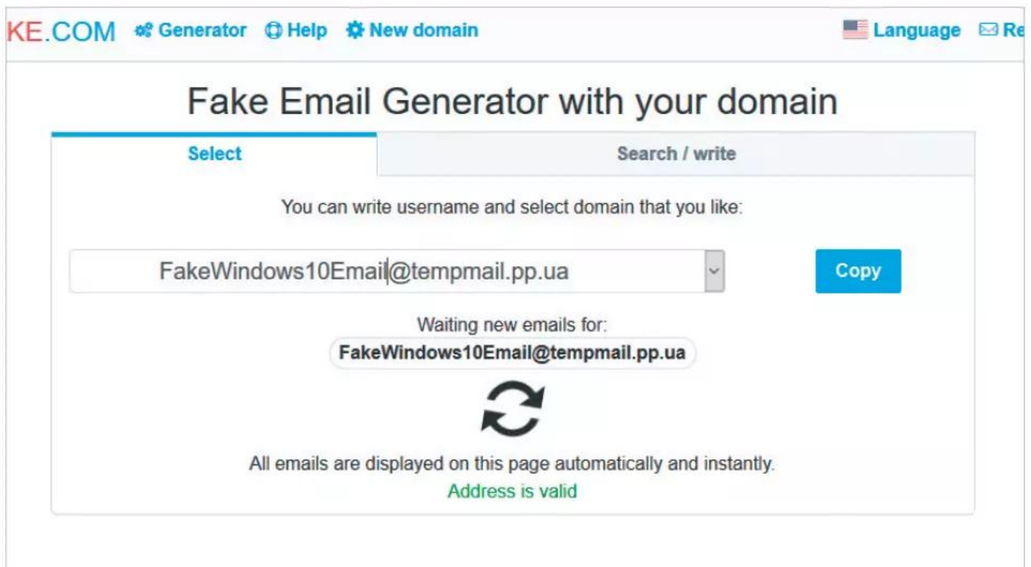
TIP 7 Flash and Java are superb entry points for malicious code to infect your computer and for snooping of various personal settings and data. Disabling both Java and Flash will prevent any such backdoors but limit your browsing experience on some sites.



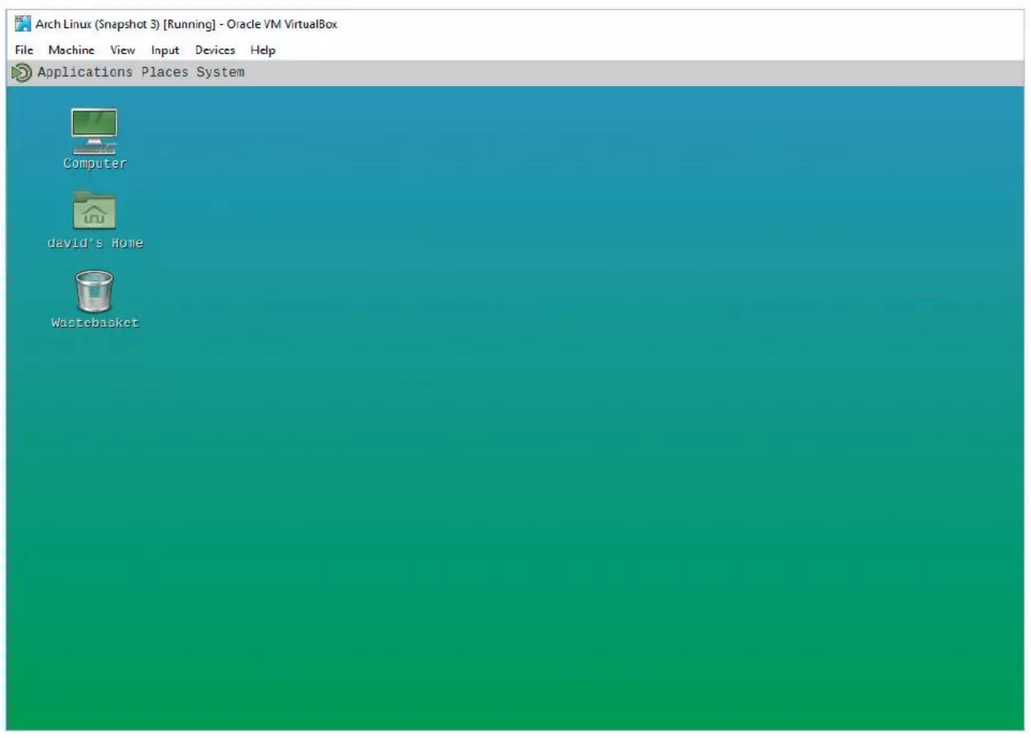
TIP 8 Encrypting your installed hard drives and any external devices you use is an excellent way of securing your data and locking down Windows. Whilst it can be inconvenient, you can be safe in the knowledge that any lost data is virtually unhackable by all but the military supercomputers.



TIP 9 Normally you'd use a valid email account to log into Windows, via an activated Microsoft account. However, consider setting up an alternative account that isn't linked to you. That way any data sent via Windows to other sources won't contain any personal data.



TIP 10 Use a Virtual Machine within Windows to conduct your day to day browsing and online work. The VM could be Windows too or even adopt a more secure environment such as one of the higher-end security versions of Linux. Either way, a VM will be far more secure than Windows on its own.



Strange as it may sound, being able to answer questions on cyber security helps expand your understanding of the subject. Plus it's a good way to test your knowledge and see how much you've taken in so far from this book.

Cyber & Windows Quiz

Answer Then, These Questions Ten

Ten questions on cyber security and Windows security. They're not too difficult but enough to make you think and consider the whole aspect of digital security and privacy.

Question: 01
Who is it okay to share your passwords with?

Question: 02
True or False: when on public Wi-Fi is it safe to send confidential or personal information data?

Question: 03
What does the 'S' stand for in HTTPS?

Question: 04
What is two-factor (or two-step) authentication?

Question: 05

Which of these is a Phishing attack?

- Sending someone an email that contains a malicious link disguised as a valid email.
- Creating a fake website that looks identical to a real one, in order to trick users into logging in.
- Sending someone a text message that contains a malicious link, disguised as something else.
- All of the above.

Question: 06

Which of the following passwords is the most secure?

- Password123
- ThV%100*Vx!
- LetM31N
- 123456

Question: 07

Give five examples of malware

Question: 08

Which of these methods of browsing is the most secure?

- HTTPS
- Private browser mode
- VPN
- Tor

Question: 09

What does AES stand for?

Question: 10

How often should you review your Windows security and updates?

- Once a month
- Once a day
- Once a week
- Once only, just after installation of Windows

Answers:

1. No one. Never tell anyone your passwords.
2. False. Never send personal or confidential data when using public Wi-Fi
3. Secure, meaning it's encrypted. Hyper Text Transfer Protocol Secure.
4. A multi-step authentication method requiring username and password, as well as extra information. Usually via a text message.
5. All of the above. All are forms of Phishing.
6. ThV%100*Vx!. It contains multiple characters, caps, lower case and isn't a dictionary word.
7. Ransomware, Virus, Adware, Trojan Horses, Worms.
8. VPN. Tor is very secure but is subject to vulnerabilities.
9. Advanced Encryption Standard.
10. Once a day. You should look at your Windows security at least once every day.

What the Experts Say

Amongst the many quotes from security experts of the modern digital age, some stand out as either remarkably fortuitous or simply worth mentioning. We've compiled ten top quotes from the security world, that both entertain and make you think.

> *Relying on the government to protect your privacy is like asking a peeping tom to install your window blinds*

> If you spend more on coffee than on IT security, you will be hacked. What's more, you deserve to be hacked.

White House Cybersecurity Advisor, Richard Clarke.

> Computer security can simply be protecting your equipment and files from disgruntled employees, spies and anything that goes bump in the night, but there is much more. Computer security makes sure no damage is done to your data and that no one is able to read it unless you want them to.

Bruce Schneier, Protect Your Macintosh, 1994.

> The only truly secure system is one that is powered off, cast in a block of concrete and sealed in a lead-lined room with armed guards.

Gene Spafford.

> No serious commentary will say that the user has no responsibility. We all have responsibilities to lock our doors in our homes and to buckle up when we get in cars.

Spokesman, Information Technology Association of America, Business Roundtable, AP, May 19, 2004.

> The condition of any backup is unknown until a restore is attempted.

Schrodinger's Backup.

> Phishing is a major problem because there really is no patch for human stupidity.

Mike Danseglio, program manager in the Security Solutions group at Microsoft, April 4, 2006.

> If security were all that mattered, computers would never be turned on, let alone hooked into a network with literally millions of potential intruders.

Dan Farmer, System Administrators Guide to Cracking.

> The whole notion of passwords is based on an oxymoron. The idea is to have a random string that is easy to remember. Unfortunately, if it's easy to remember, it's something non-random like 'Susan'; and if it's random, like 'r7U2*Qnp,' then it's not easy to remember.

Bruce Schneier.

> Like the death of a celebrity from a drug overdose, publicised data loss incidents remind us that we should probably do something about taking better care of our data. But we usually don't, because we quickly remind ourselves that backups are boring as hell and that it's shark week on Discovery.

Nik Cubrilovic, TechCrunch.com, October 10, 2008.

> People often represent the weakest link in the security chain and are chronically responsible for the failure of security systems.

Bruce Schneier, Secrets and Lies.

Online Child Protection

We as adults face numerous risks when online, children face significantly more. The predatory nature of some make the Internet an extremely hazardous place for a child to explore, despite the great benefits that it offers. The following pages will look at the risks involved for children when online but also how to prevent them and how to better protect your child while they navigate this virtual minefield.

126 Children Online: What are the Risks?

128 Social Media & Children

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132 Online Grooming

134 How Safe are the Sites Your Child Can Access?

136 Email and Child Safety

138 Top Child Friendly Email Programs and Services

140 Cyberbullying

142 How to Prevent and Deal with Cyberbullying

144 Helping Your Child Through the Internet

146 Your Child and Online Gaming, is it Safe?

148 Staying Safe when Gaming Online – Advice for Your Child

150 Monitoring What's Going On

152 Monitoring Online Activity for Non-Technical Guardians

154 Tips for Technical Guardians to Monitor a Child's Online Activity

156 Ten Monitoring Tools to Install and Use

158 Using the Windows Hosts File to Block Sites

Children Online: What are the Risks?

Every parent or guardian knows that being online represents an entirely new frontier of potential dangers for young children and teens. These dangers come in many forms, with each being capable of greatly affecting the lives of all involved.

The risks a child faces when online are tremendous and it's not just the usual collection of malware that focuses on luring young people into executing it. It's also the individuals, sites, language used, videos and a whole host of other forms of information and infiltration. These have quickly become the wolf in sheep's clothing, disguising themselves with the single purpose of catching hold of a child's online activities.

Grooming

One of the more prominent modes of luring children into saying or doing something they shouldn't is online grooming. The grooming itself could be for many different purposes, either to satisfy the perversions of an individual or group or to gain information on the family as a whole, and everything else in between.

Online grooming has evolved drastically in recent years with the expansion of social media. We'll look at the impact of social media and online grooming in the next couple of pages; suffice it to say however, that it's an on-going concern to parents and guardians, as well as those whose jobs involve the protection of young people.

Radicalisation

A more recent and newsworthy example of online dangers for children is radicalisation. This can come in the many different forms but essentially it's preying on young minds not yet capable of being able to discern between differing viewpoints in order to lure them into the mindset of those doing the radicalisation.

The more popular examples at present are extremist groups but it's not always something that's associated with terrorism or those groups affiliated with terrorist organisations. Radicalisation is the adoption of extreme political, social or religious ideals, ones that undermine contemporary ideas and the expressions of a nation. It's something that can occur quickly or over long periods of contact, with someone who follows this line of extremist thinking. Needless to say, it's something that a young mind can easily be tricked into believing and thus is something we as parents and guardians need to be aware of.

Inappropriate Content

The dangers of the Internet aren't always shady characters hanging around chat rooms pretending to be a twelve year old. Children with online access are just a stone's throw away from shocking, violent and pornographic material.

We've looked previously in this book at rogue links, or something masquerading as a valid website that can easily be used to send the hapless browser to a site that contains either something malicious or sinister, or simply something that's considered socially unacceptable.

Pornography sites are certainly of more prominent and easily accessible forms of unacceptable videos and images that children could venture into unsuspectingly. There are also many other forms of content that feature death, torture and other such despicable acts of violence. Either way, these are contents children should never witness.

Cyber Bullying

Cyber bullying comes from many diverse sources on the Internet. It's not simply others at school bullying someone on Facebook, Twitter etc., there are some startling statistics that detail the kind of bullying that occurs in online gaming.

For example, leading anti-bulling charity Ditch the Label, recently reported on a sample of 2,500 young people aged between 12 and 26. The report discovered that 64 percent were trolled whilst playing an online game; 57 percent experienced some form of bullying; half experienced hate speech and threats of violence; 39 percent received unwanted sexual contac;, 34 percent had private information shared; and 38 percent had been hacked whilst playing.

With comments such as 'I hope your parents die' and 'I'm coming to kill you', and children not being able to process this kind of violence, cyber bullying whilst playing online games is certainly an issue that needs addressing.

Identity Theft

Possibly used as part of grooming in order to gain information from a child, identity theft is a growing concern. Keeper Security, a leading password management app, recently published an infographic on web security. According to the company's sources, children are thirty five times more likely to have their identities stolen, with an estimated 1.3 million children affected each year by identity theft and nearly half of them under the age of six.

It's a shocking statistic and one that can lessened through online education and not leaving a child alone in front of the Internet; both not always easy to accomplish but also not impossible.

Online Scams

Children are vulnerable to varying forms of online scams purely due to their, in some ways, innocence and lack of experience, as well as acceptability of what they read to be a fact or truth. It's therefore quite easy to dupe a young person into a scam that either tries to take money from them, or some form of personal information.

The likely scams that children often fall for are usually related to gaming, i.e. 'click here to win 1000 in gold' 'get extra lives' or something that gives them an advantage in the latest game. Often scams will involve having them click a link that's offering to sell the latest games console, football kit, phones and other technology, all at unbelievably low prices. Naturally it's all fake but to a child it's an offer that's hard to refuse.

These are just some examples of what's out there and what lies in wait for a young person with an inquisitive mind and a trigger-happy mouse button. These individuals and groups have designed their risks to target children in particular, so we need to make doubly sure that when online our children are as educated, savvy and safe as possible.

Whilst the Internet and all its contents are an incredible learning resource that can bring

together people from all over the world, inevitably there will be those who wish to exploit some of the most vulnerable among us, children and young people.

Social Media and Children

The impact of social media on children has been the subject of numerous reports over the last few years. With more and more children and young people gaining access to Facebook, Twitter, WhatsApp, Instagram and so on, there's a growing concern as to how it's affecting online safety.

Any site or portal where some form of social interaction occurs can be classed as social media, so even if you don't allow your children access to Facebook et al, there's still a chance they're in contact via gaming or an app of some description: YouTube, blogs and so on.

Reports from the American Academy of Paediatrics has found that using social media does provide benefits for young people. According to findings, regular use of social media platforms enhances communication, social connections and technical skills. Not only that, it allows young people to connect with extended family members and friends they won't see for perhaps years at a time, as they live in places they're not likely to visit. Depending on the content, social media can help a young person develop better perspectives on various issues in the media and when talked about with an adult, they can begin to form their own opinions, an impressive stage in a young person's life.

In some ways social media can help a young person express their inner feelings and encourages freedom of thought and engagement with similar age people. There's potential for a young person to learn new things, whether that's simple life hacks or discovering someone's job role. All in all, it adds up, on paper at least, to a positive experience that can greatly help a young person grow and help them form a more mature understanding of the world around them; something we didn't have before the Internet.

Sadly, with every positive aspect there are several negatives. Whilst the effects of social media on a child can be for good, they are mostly overshadowed by the popular negative aspects that ultimately rise to the surface. The sheer vastness of social media is one of the main causes for such negativity. Due to its freedom and limitless potential, there's no definable control on the scope of information. Yes, the social media platform can apply rules, filters and restrictions but these seem to be far too easily bypassed, and to some degree worthless in the end.

Cyber bullying is rife on social media. From threats made to young people, to digs at their appearance and body shaming, it's a platform that has quickly devolved into a pit of despair and depression for some unfortunate youngsters. This can lead, in extreme cases, to fatal consequences but generally the collective term for the negativity plied upon the youth of today is 'Facebook Depression'.

In recent months, the Royal Society for Public Health together with the Young Health Movement released a survey that revealed Instagram to have the negative impact on a young person's mental wellbeing, accusing the media platform of deepening young people's feelings of inadequacy and anxiety. It's a disturbing fact that on top of the pressures of school or college life, young people are having to put themselves through the mill whilst simply sitting in front of a screen.

Mental health is a major concern amongst young people but social media also presents its darker side through online grooming, potential radicalisation and the spread of malware. Each of these will greatly affect a young person and can lead to higher levels of anxiety, depression and withdrawal. For example, the spread of malware may not sound too negative on the wellbeing of a young person but put yourself in the place of the child who has unwittingly executed some form of malware on the family computer or the school network. The negative emotional effects from this happening can be huge to someone whose immaturity can't deal with the aftereffects.

The safety side of social media and children comes in many forms then. Mental health concerns, access to inappropriate content, Internet borne digital threats, bullying, grooming, loneliness and body image. Where it's easy to point out the risks of Internet stranger danger, it's not always easy to cover what happens should someone post edited and manipulated images of a young person to social media.

Therefore, the pressure on parents and guardians is just as immense, when helping our young people navigate the digital wild west frontier that is social media.

Using social media is amongst the most common online activities of the modern day young person. The likes of Facebook, Twitter, Instagram and many

more all contribute to the billions of hours collectively spent via computers and mobile devices, with online gaming quickly following on the heels of the more popular social media portals.

Search Engine Safety

The search engine is the portal into the wider Internet and through it we can view everything from man's first steps on the moon, to extremist group propaganda videos. It's therefore paramount that children are aware of the dangers of the search engine.

While the Google search portal isn't dangerous in itself, it's what potentially lies behind the search entered that makes it such a dangerous place for young people to venture into. Many young people are somewhat more tech-savvy than most adults but the younger children are at risk from a seemingly innocent search resulting in inappropriate content being displayed.

> ***Safer Searching***

It doesn't take much imagination to consider how a particular scenario may be played out. A child is left in front of a search engine, they enter something to do with a school project on World War 2 and start to follow the links. Although part of history, some of the images that may be displayed could be deemed inappropriate to a primary school child, or those as young. To expand, what if the child then follows links to modern day warfare and from there potentially to videos depicting extreme violence. That then can snowball into accessing what can only be described as the real nasty stuff, which isn't something any child should ever witness.

The above scenario is, of course, the extreme end of what could potentially happen. Without going down the fearmongering road, the search engine can lead someone unsuspecting into a whole heap of trouble. That trouble can come from school, your ISP should any illegally hosted content be accessed, or even from accessing malware, so it's worth making sure that whatever search engine you use, any filters are currently set to On or Strict and it's recommended that you don't leave a child alone in front of a search engine for any length of time.

If you consider Google to be too risky, there are the likes of DuckDuckGo, a search engine that not only protects your data by not logging any searches but also features an extensive filter engine. Likewise StartPage, Bing, Boardreader and CC Search can also fulfil most users' requirements whilst filtering inappropriate content and allowing a higher degree of Internet privacy.

Alternatively there are steps we as parents, adults and guardians can do to help prevent any inappropriate content from appearing in a search result. There are numerous sites that have been designed specifically for safer searching with children in mind. The strict search policies of an engine may be good but there's always a chance that something could get through the net and reveal itself on the screen.

Six Safe Search Sites

Therefore, here are six child safe search engines. The age ranges vary but generally they're pitching to primary or low-middle school children. Either way, they're certainly worth considering and bookmarking for when a child is using the computer for school or general research.

SAFE SEARCH KIDS

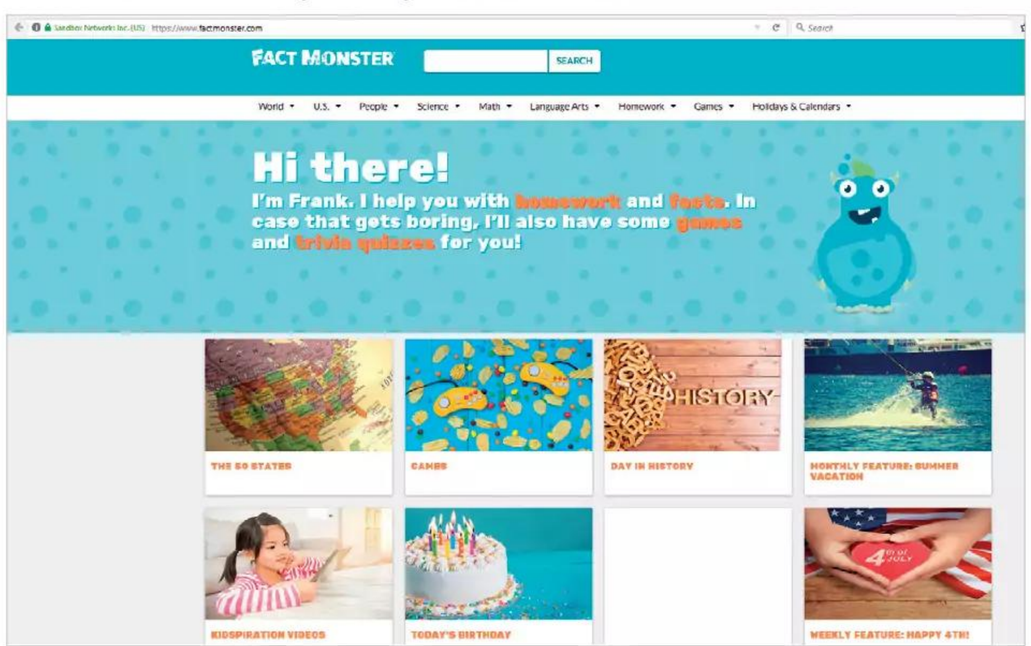
A UK-based search engine that utilises Google's SafeSearch technology and provides a friendly front end. It's a good starting point and one that doesn't display picture icons along with search results; thus eliminating any inappropriate images that may unintentionally slip through.

KIDSCLICK

KidsClick is a search engine designed and created by librarians for children who are searching for school related research. Each result returned features a description and reading level, along with suggestions and homework helpers.

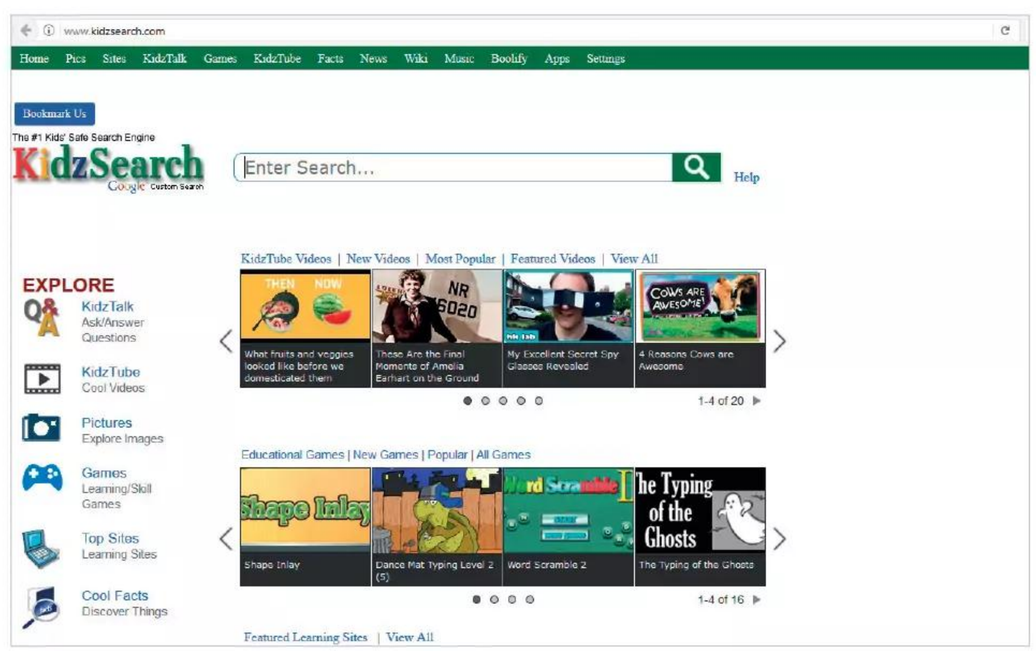
FACT MONSTER

Fact Monster is an excellent site that's dedicated to helping children research school topics. It's a free online almanac, dictionary, encyclopaedia and thesaurus and is aimed at children between the ages of eight and fourteen.



KIDZSEARCH

Here's another customised search engine utilising Google's SafeSearch strict results filter. Additionally, it also features a banned keyword search system that will not return any results from the black list of banned words.



KIDREX

A simple site that's designed for much younger users. KidRex is powered by Google's own search engine but as you'd expect, filters out any inappropriate content. Further more, as a parent, you're also able to customise the filters to ensure safer or less restrictive search results.

KIDDLE

A great and friendly search engine for children and young people. Kiddle provides strict filtering along with child-friendly results that are grouped by those deemed safe and handpicked by the Kiddle editors. Here are trusted sites that aren't specifically written for children but provide understandable content and safe famous sites, that are harder to understand but still relevant.

Online Grooming

Of all the many despicable acts and threats that arise on the Internet toward young people, online grooming is undoubtedly one of the worst examples. It's a tricky act to confirm at times too, as those who groom often cleverly hide their tracks but it is possible to spot signs of it happening.

The online part obviously involves the groomer building this emotional connection via chat rooms, online gaming, social media, blogs and even comments sections on popular websites, such as YouTube. The act itself is surprisingly subtle. The groomer first establishes a rapport of some kind, perhaps agreeing with a child on a comment he or she has made regarding something online; let's use a game as an example. The young person has written in the game's blog that something doesn't work, the groomer agrees with them and starts a very basic conversation building a form of trust between the young person and themselves.

This can go on for as long as the groomer feels they're getting an advantage, according to leading child experts. The grooming can then move up a level whereby the groomer starts to become more personal, adopting a persona of another young person roughly the same age the child in question. Perhaps eventually they ask where they live and if they could meet up after school or something. Of course it doesn't always play out that way, there are many different ways in which the groomer can satisfy their perversions without ever having to physically meet the young person in question.

The NSPCC states that groomers can be strangers to the young person, a friend, professional or even a family member; they can also be either male or female and of any age; as the UK's Childline mentions, 'anyone can groom someone'.

The more prominent reasons are chiefly sexual conversations, wanting to have naked images of the young person as well as videos, access to the young person's webcam, mostly for sexual purposes, or to gain further information regarding the family; there are examples of grooming in order to obtain passwords for banking and such. Often there's an element of blackmail involved, where a young person has sent on images or videos of themselves and the groomer now either demands more images or even money, or else they'll post the images up on the nternet.

The signs of online grooming vary depending on the young person and how far into the act of grooming they've been drawn. However, according to both the NSPCC and Childline, the most common signs are:

- The young person being very secretive, including their online activity.
- Having older boyfriends or girlfriends.
- Going to unusual places to meet up with friends.
- Having new things such as clothes, phones or other objects they can't readily explain.

From the perspective of the young person, a groomer will usually:

- Send you lots of private messages.
- Ask you to keep conversations a secret.
- Attempt to find out more about you and your family.
- Start to send you sexual messages, usually starting with jokes then moving on.
- Blackmail you into sending images or videos by threats of violence to you or your family.

The situations can vary and the groomer is adept at hiding traces of their activity as well as lying to someone about themselves. Childline states: "It's important to remember that there isn't one type of groomer. Many different kinds of people have used the Internet to trick, force or persuade young people into sharing sexual images of themselves. Often it's an adult pretending to be a young person, but not always."

Parents and guardians can watch out for certain types of behaviour, which could be signs of grooming, regardless of whether it's online, via a phone chat app or even in person. The NSPCC have listed the following as potential signs:

- Withdrawn
- Suddenly behaves differently
- Anxious
- Clingy
- Depressed
- Aggressive
- Problems sleeping
- Eating disorders
- Wets the bed
- Soils clothes
- Takes risks
- Misses school
- Changes in eating habits
- Obsessive behaviour
- Nightmares
- Drugs
- Alcohol
- Self-harm
- Thoughts about suicide

Both Childline and the NSPCC have excellent websites dedicated to online grooming, along with advice to both parents and guardians, as well as young people and children. You can find them at https://childline.org.uk/info-advice/bullying-abuse-safety/online-mobile-safety/online-grooming/#10 and https://nspcc.org.uk/preventing-abuse/child-abuse-and-neglect/grooming/. It's certainly worth reading through each site to gain a better understanding of online grooming, what the warning signs are and how to support a young person should any signs be apparent.

The NSPCC (the National Society for the Prevention of Cruelty to Children) defines grooming as when someone builds an emotional

connection with a child to gain their trust for the purposes of sexual abuse, sexual exploitation or trafficking.

How Safe are the Sites Your Child Can Access?

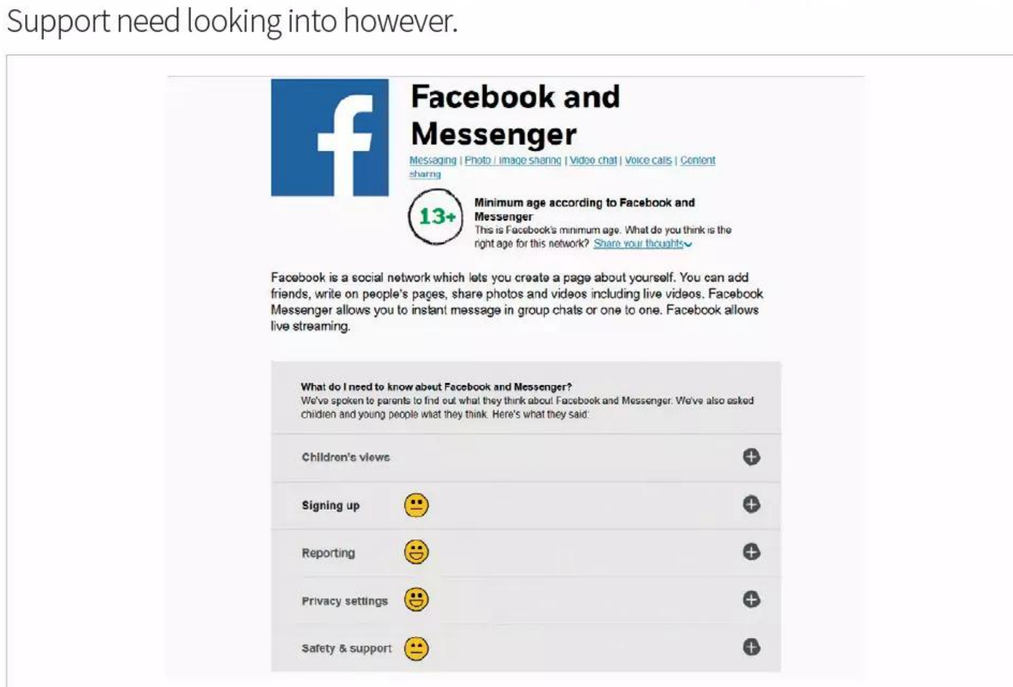
Mobile operator O2, YouGov and the NSPCC have teamed up with Net Aware to create a site that reviews popular sites and apps that children and young people use. This guide allows parents and guardians to view the information to help them understand their child's online world.

Net Aware

Net Aware is an excellent site, and can be found at https://net-aware.org.uk/. Within you can find an A to Z of Most Popular sites and how safe they actually are according to face icons. Here are ten of the popular choices with their safety information.

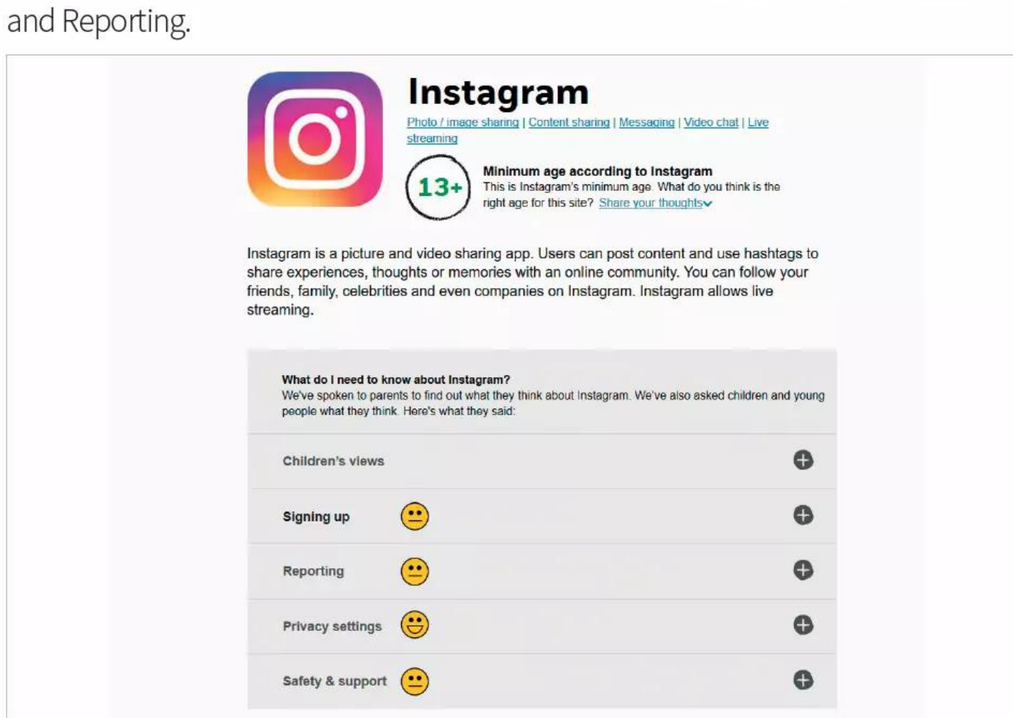
FACEBOOK AND MESSENGER

Facebook has gone to great lengths in recent years to ensure a higher degree of safety. There's a lot of ground left to cover but from the point of view of Net Aware, it's about average in terms of safety. Signing up and Safety & Support need looking into however.



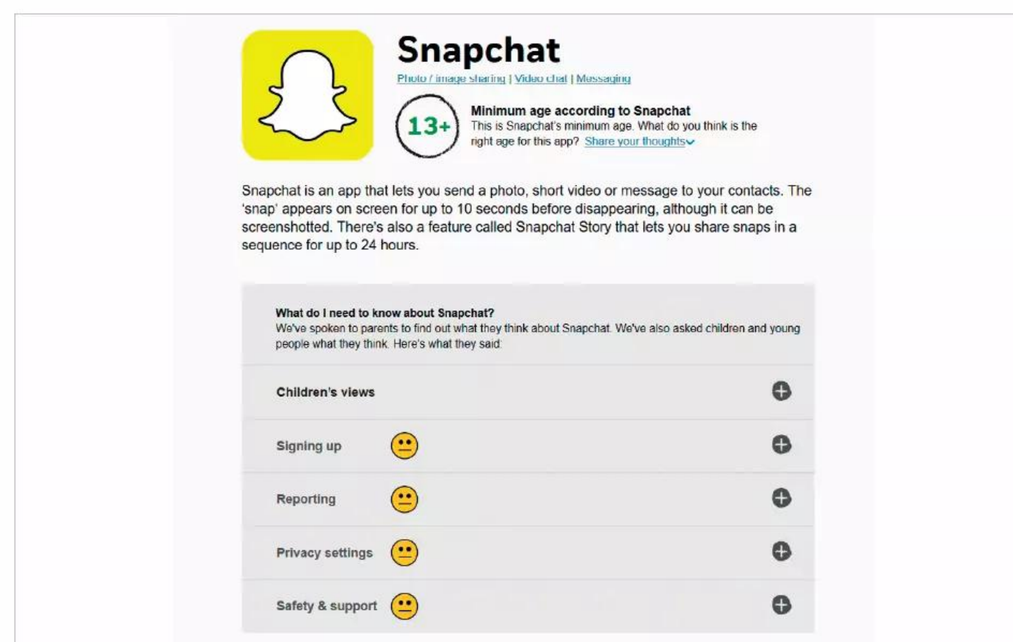
INSTAGRAM

Instagram only manages to gain an upvote (smiley face) in the Privacy Settings section, with more rigid controls being asked for from parents and carers with regards to Signing Up, Safety & Support and Reporting.



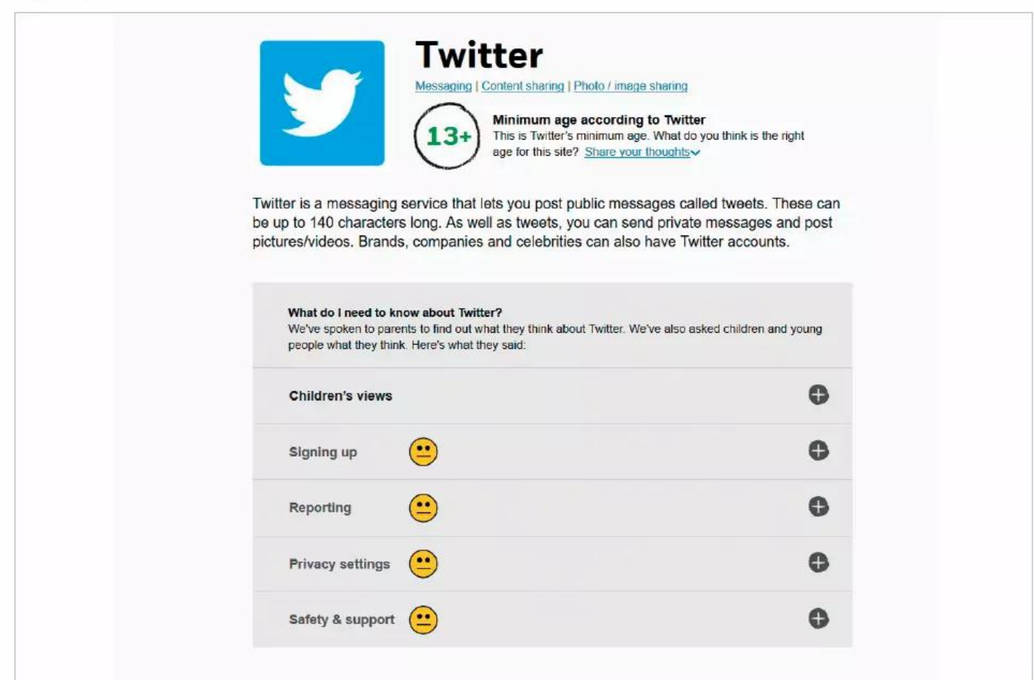
SNAPCHAT

According to Net Aware, 32% of children and young people who reviewed Snapchat thought that it can be risky. There aren't any 'happy face' icons among the sections, so be wary of how it works.



TWITTER

Some of the major concerns regarding Twitter are: uncontrolled Tweets, fake and scam tweets and abusive behaviour. It doesn't rate too highly, on a par with Snapchat, so it's worth reading through the available content prior to signing up or allowing a young person to sign up.

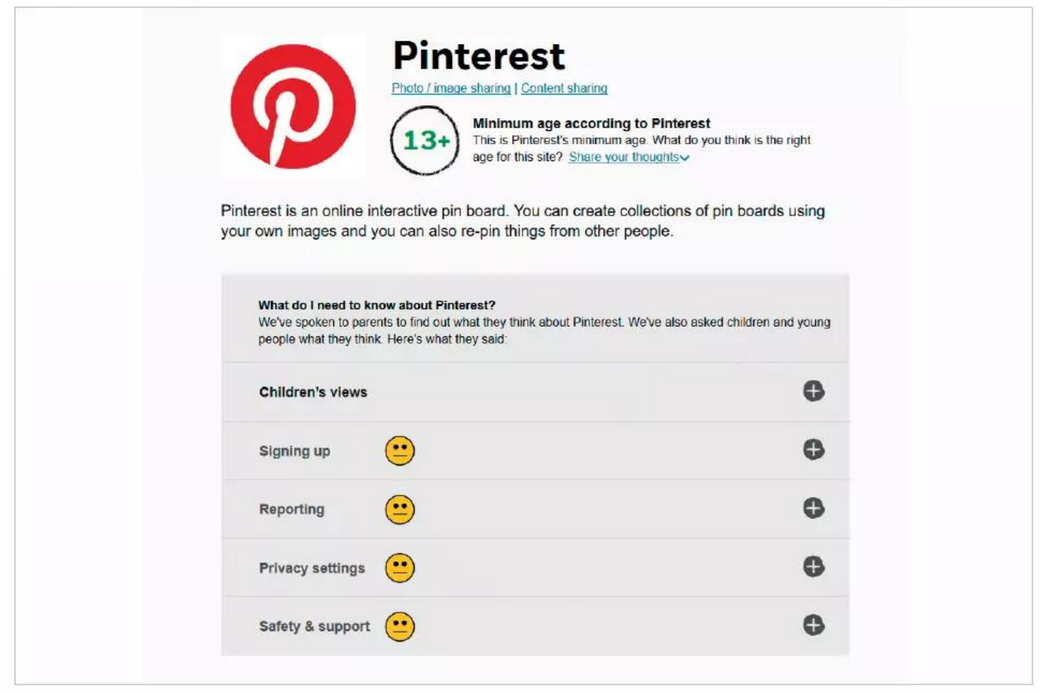


WHATSAPP

Another not too highly rated site, WhatsApp raises several concerns over ability to be contacted by strangers, random people being able to view your profile picture and the potential for receiving scam messages.

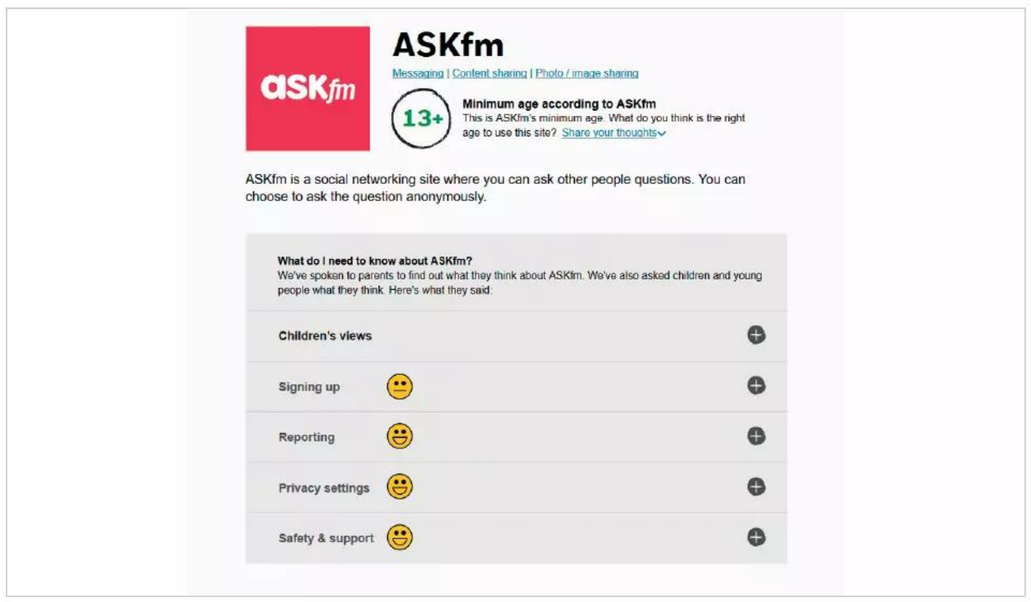
PINTEREST

The main concern with Pinterest is that young people and children can't always control what they see, which means there are times when inappropriate content can be viewed by minors. Again, Net Aware rate it the same as YouTube, Snapchat and Twitter.



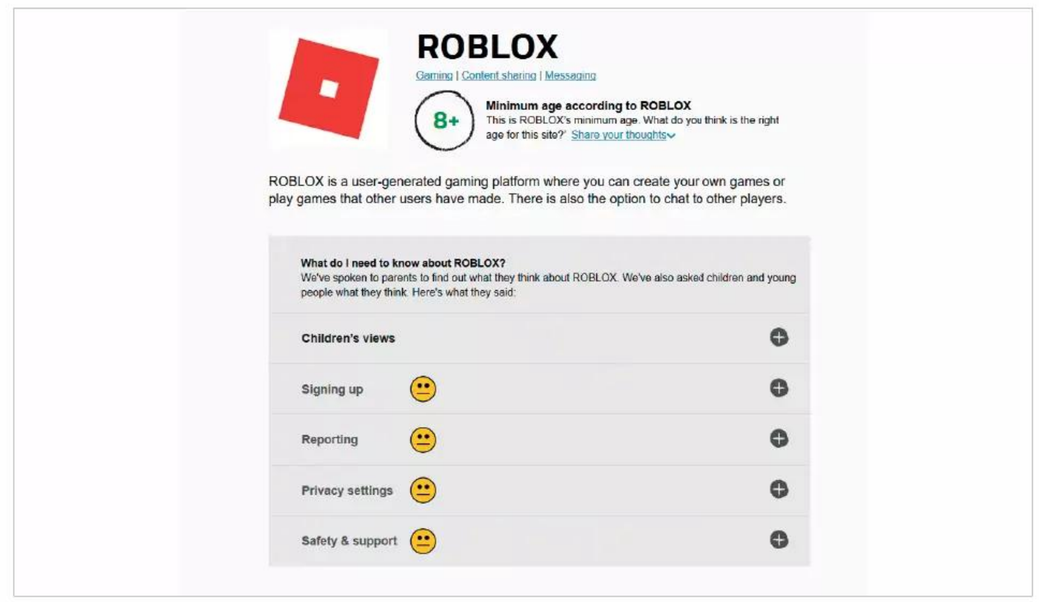
ASKFM

This is a social networking site where you can ask other people questions, anonymously if you want to. The anonymity raises concerns, along with instances of bullying and trolling, as well as possible exposure to inappropriate content. However, it does have the highest 'face' rating off all the apps so far.



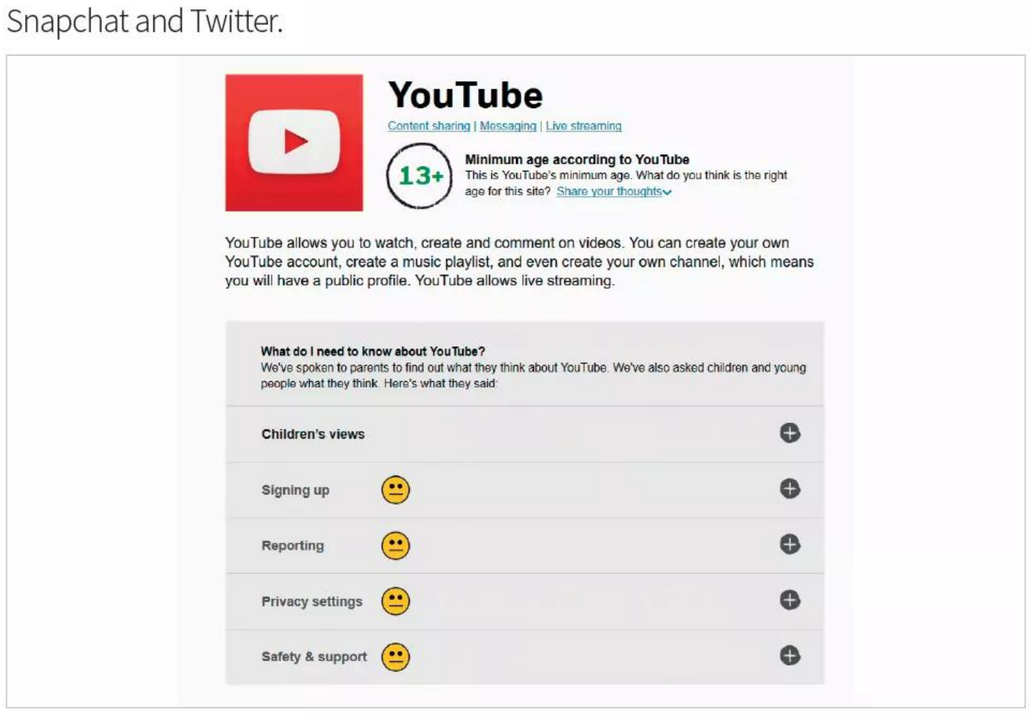
ROBLOX

This is an online game where you're able to play games created by others, or create games yourself. Whilst fun, it does have issues whereby users can add you to their friends list and communicate with you and it features in-app purchasing, which can be difficult to manage for parents and guardians.



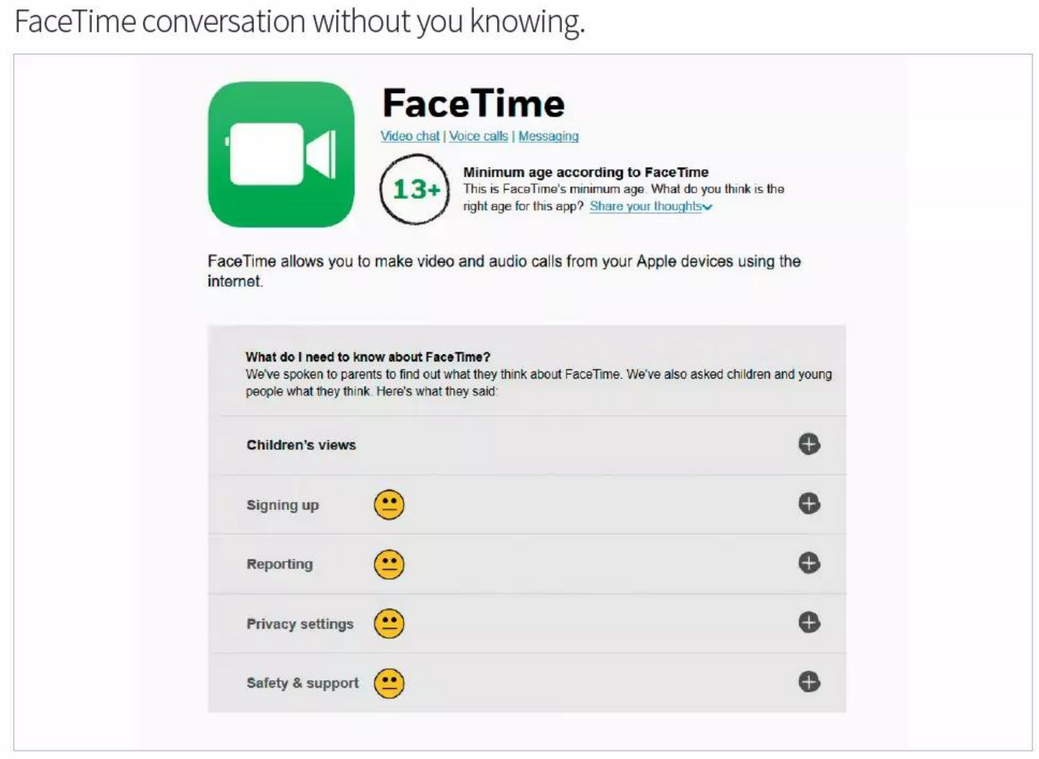
YOUTUBE

YouTube's infamous use by extremist groups when posting inappropriate videos is by far one of the most negative aspects of its use among young people. Examples of abusive comments and possibly inappropriate adverts are concerns too. Net Aware rates it on a par with Snapchat and Twitter.



FACETIME

Apple's FaceTime is one of the most used video chat clients available. However, it has been noted that people you don't know can FaceTime you and it's possible to record or take screen shots of a FaceTime conversation without you knowing.



Email & Child

We're often so concerned over social media, online gaming and chat sites that we tend to ignore one of the most common threats to online safety for young people and children, email. While it's a more manageable element, it does carry plenty of dangerous potential.

In reality it doesn't take too much of a technical genius to enter into a search engine, "fake email accounts" or something similar. The returned results, such as Fake Email Generator, Mailinator, ThrowAwayMail and FakeInbox are all designed to help you create a fake account that can either be single use or used regularly. This of course means that a person is able to create a false persona and sign up for Facebook and the like using a browser's private function, and have access to accounts without someone else knowing.

This works both ways, from the point of view of the young person gaining access to a site they shouldn't and for someone who's creating accounts ready for grooming, or something similar. With access to a fake email, a young person has the potential get into a variety of potential dangerous situations. They could be contacted by someone who is trying to groom or send radicalised content, they could also become the subject of a hack and unwittingly execute code that can deploy a virus, ransomware or other malware, along with possible backdoor hacks to gain access to the system the young person is using.

It's not just fake email sites that pose a danger when it comes to young people and children; although fake email sites usually don't have the better protection and anti-malware restrictions that more legitimate sites employ. Google Mail, Yahoo and so on can represent a weak link in the chain of digital protection for children and young people. The dangers are mostly the same but thankfully these online mail providers have better levels of malware protection.

So how would you, as a parent or guardian, combat potential email threats for children and young people? You may not be able to police their mobile accounts all the time but you can insist that they allow you access to the account on a regular basis to check that they're not in conversation with someone unknown, or that they're not receiving and responding to reams of spam and malware ridden emails. However, that does seem something of an Orwellian approach to managing a young person's email account.

Another possibility is to set up a family email account, separate from the parents or guardians' accounts, where the entire family has access and can utilise to sign up for games, safe sites and the like. It's a more open approach, whilst still preserving privacy for the adults and if you use folders within the email client or website, then there's some privacy for the young person too.

Naturally the best form of email attack and threat prevention is through education. Both the NSPCC and Childline recommend that you talk to your child and come up with a set of workable rules and conditions that are fair but protective. Educate them on the dangers of communicating with a stranger and inform them that online grooming takes place and how it works, also include how viruses work and other forms of malware, and how phishing and other forms of threats work too.

There are some tips that we as parents or guardians can use to help children and young people:

- Treat all people on the Internet as strangers, even those who could be friends.
- Never give out any personal information via email to an unknown source or site.
- Be wary when choosing an email name, don't use anything to identify your gender or anything provocative.
- Never open an email attachment. Check with a parent or guardian first.
- Never reply to an unknown email and never send any images of yourself.
- Always tell a parent, guardian or teacher if you've been contacted by someone you don't know.
- Never respond to a threating email or someone attempting to bait you into contact.
- Don't always believe everything you read in an email. Phishing attempts come as virus hoaxes.
- Don't believe you've won £1,000,000 or react to limited time ridiculous offers on technology or fashion. It's nearly always fake emails trying to get you to visit a site.

Another possibility is to use one of the many child friendly email programs and online services. There are ample available to try out and over the next couple of pages we take a look at ten of the more highly recommended services.

Email at first doesn't appear to be too much of a concern for the parent or guardian, after all we can view what emails are coming in to our accounts. However, it's not too difficult for a tech-savvy youngster to create an

> "Email Risks"

alternative email account, usually one that's web-based, that they can use to access games and sites you wouldn't normally allow them to.

Safety

Top Child Friendly Email Programs and Services

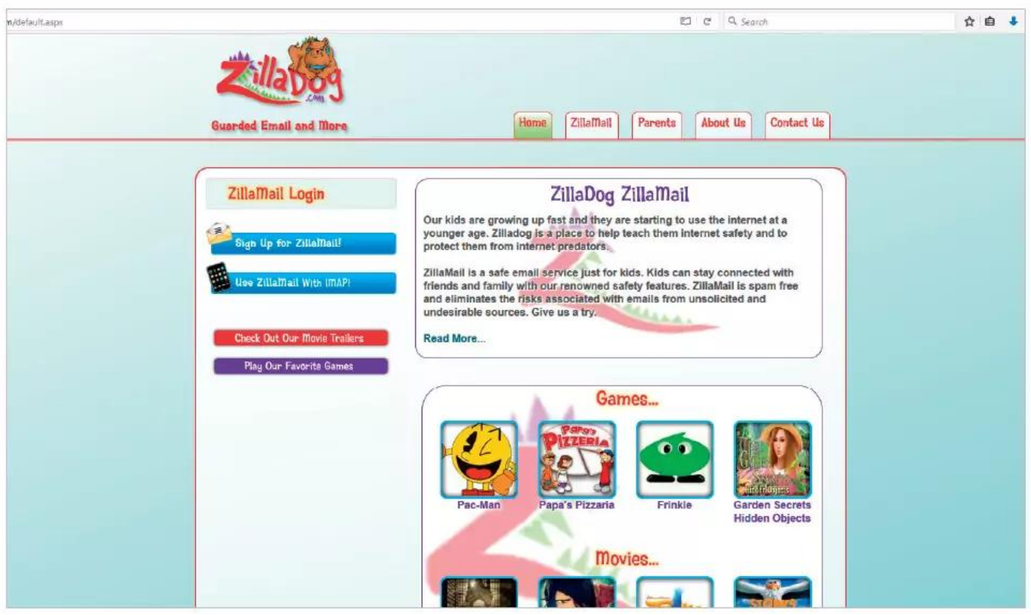
An email account for a child or young person is a great way for them to communicate with friends and family; however, as we've seen, it can be a dangerous tool. Therefore it's best to ensure they're using a safe, child friendly email account.

Ten Child Safe Email Accounts

It's not always easy to police and monitor an email account, so here are ten child friendly email accounts and related services that will help make the job of keeping children safer when communicating via email.

ZILLAMAIL

ZillaMail is run under the ZillaDog.com brand, created by parents for children. It's an easy to use, friendly service that also combines child safe online games and links to child safe websites, such as Cartoon Network and the like. ZillaMail has some interesting aspects and features, which makes it an excellent choice for parents and guardians.

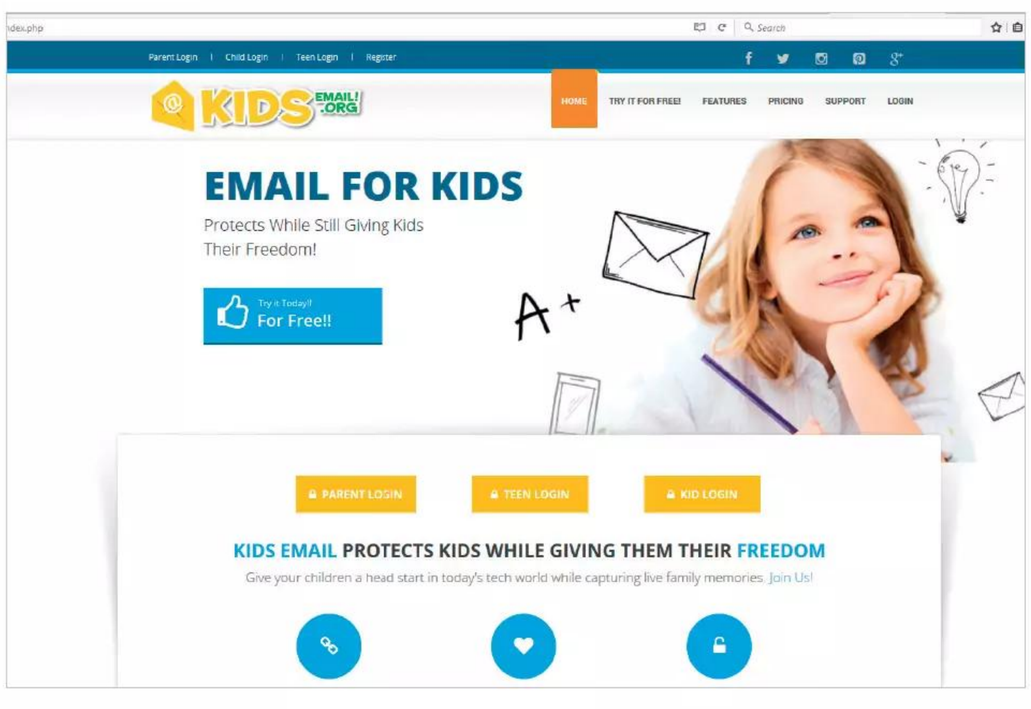


ZOOBUH

ZooBuh has an impressive list of benefits and features for parents and guardians to look over when considering an email provider for their child. Adjustable spam filtering, the ability to delete attachments, block specific senders, see activity logs and a Predator Catch Phrase alert system all add up to a great service.

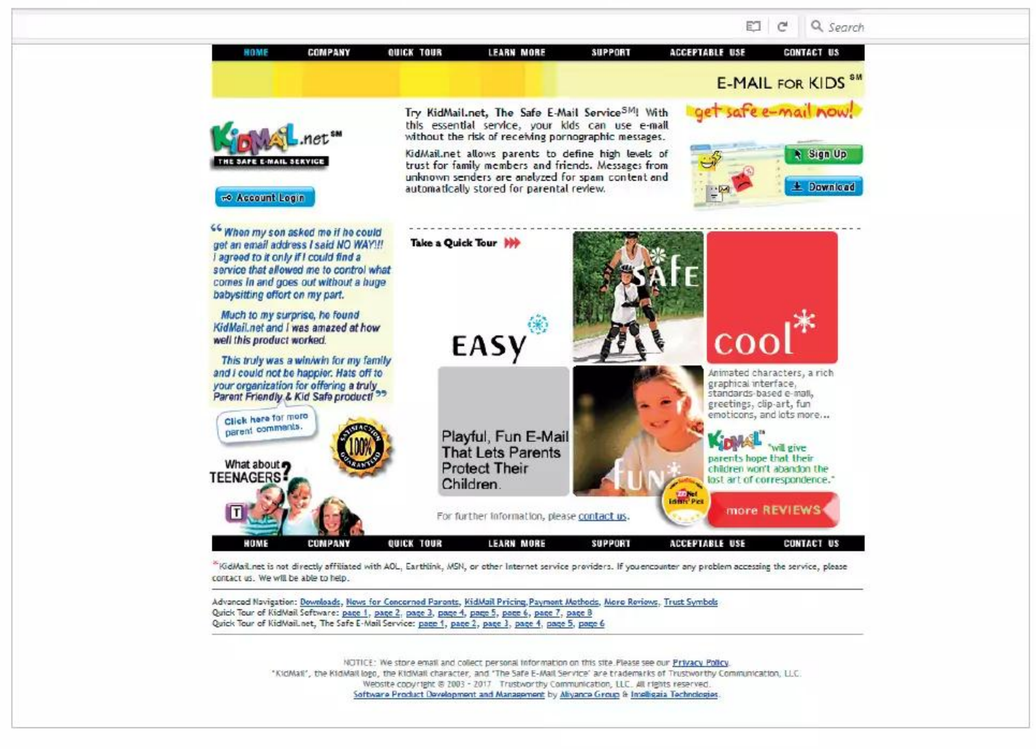
KIDSEMAIL

KidsEmail is a paid for service, offering a 30 day free trial period. For your money you get mail monitoring for all incoming and outgoing emails from the child's account, time restrictions, blocked senders, no adverts, spam filtering and an easy way to add friends and family contact details.



KIDMAIL

KidMail is a low cost subscription email service that caters for both young children and older young people. Parents and guardians have full control over the email account and the messages that come and go from the child's account, along with many other benefits and features.



TOCOMAIL

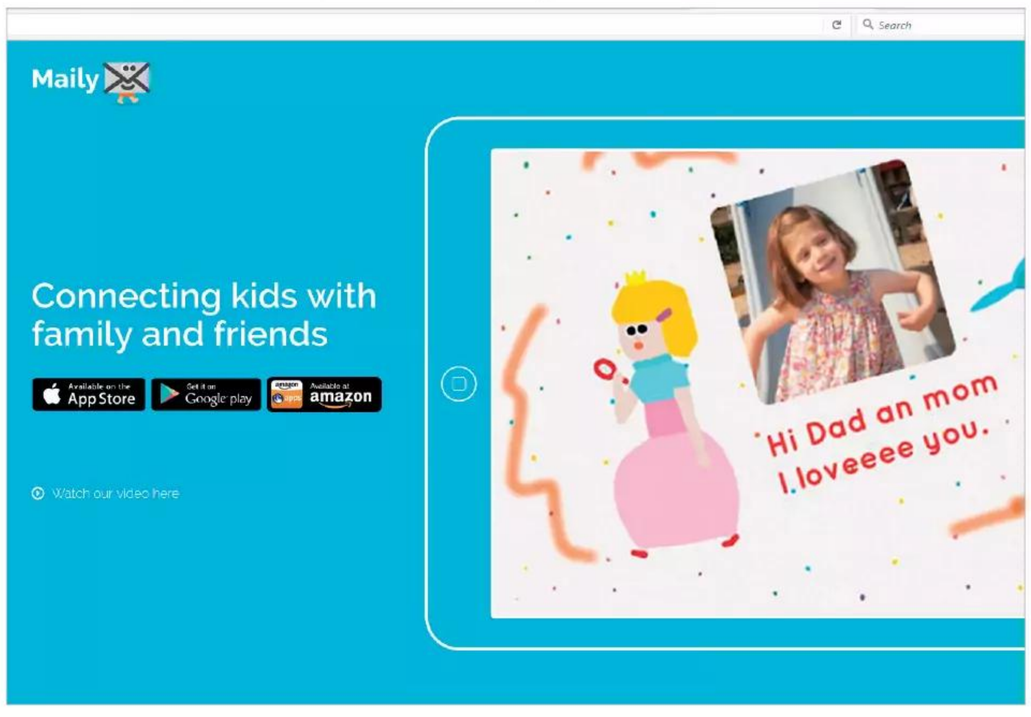
Another well presented service, Tocomail offers the child, parent and guardian a wealth of fun and useful features. It brings a lot more than just email to the table, for example children get access to a drawing board app, to create their own attachments, whilst parents get notifications via an app when the child has received an email.

GMAIL

Providing your child is thirteen years or older, they can get access to a Gmail account. Gmail isn't the first email service that springs to mind when considering a young person friendly email account but with careful use of its filters, you can set up a good and reasonably safe email environment for them.

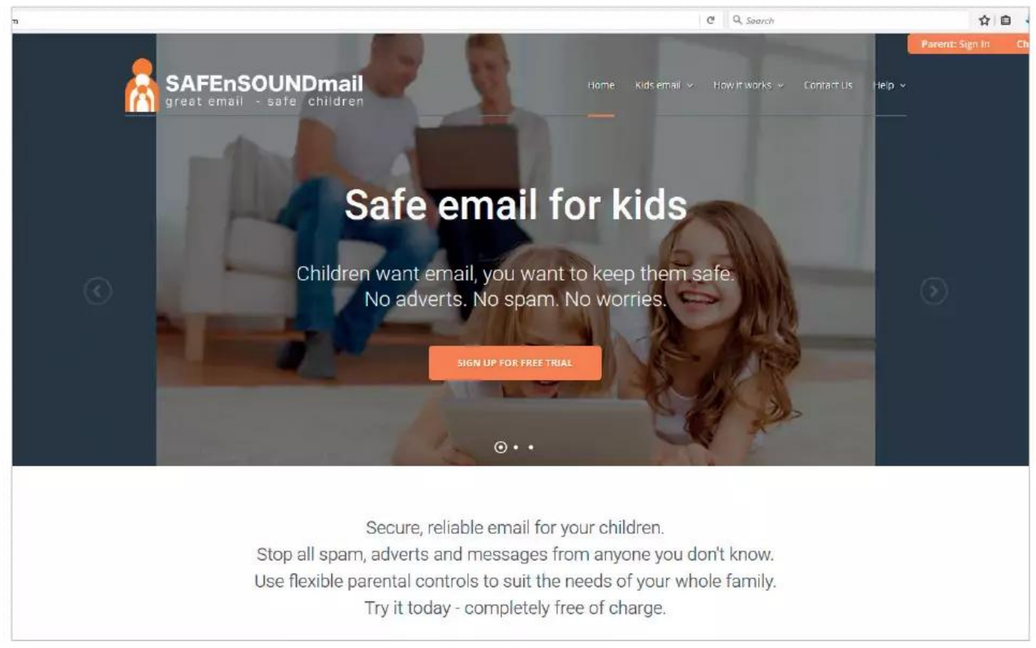
MAILY

This is a child-friendly email app for iOS and Android devices. It's fun to use, secure and offers the parent or guardian ample control and restrictions for the child's account. With it children can stay in contact with specified contact lists, whilst still remaining safe online.



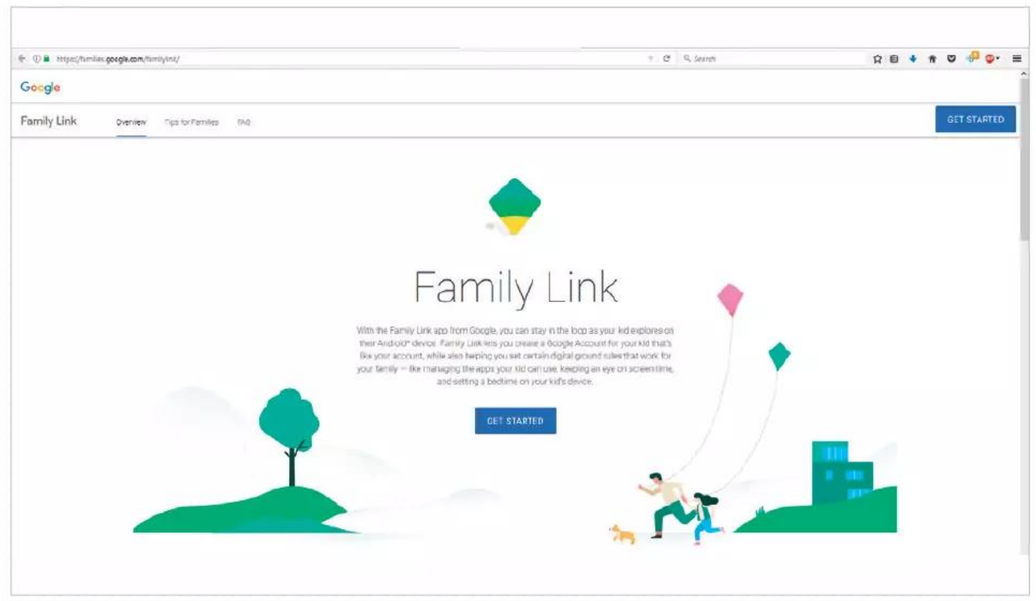
SAFENSOUNDMAIL

SAFEnSOUNDmail has plenty of features available to those who purchase the subscription; however, there's a free 30-day trial to begin with. There's support for Apple, Android, Windows, Mac and Chromebook devices, up to five child accounts available, customisable controls and settings and elevated levels of encryption.



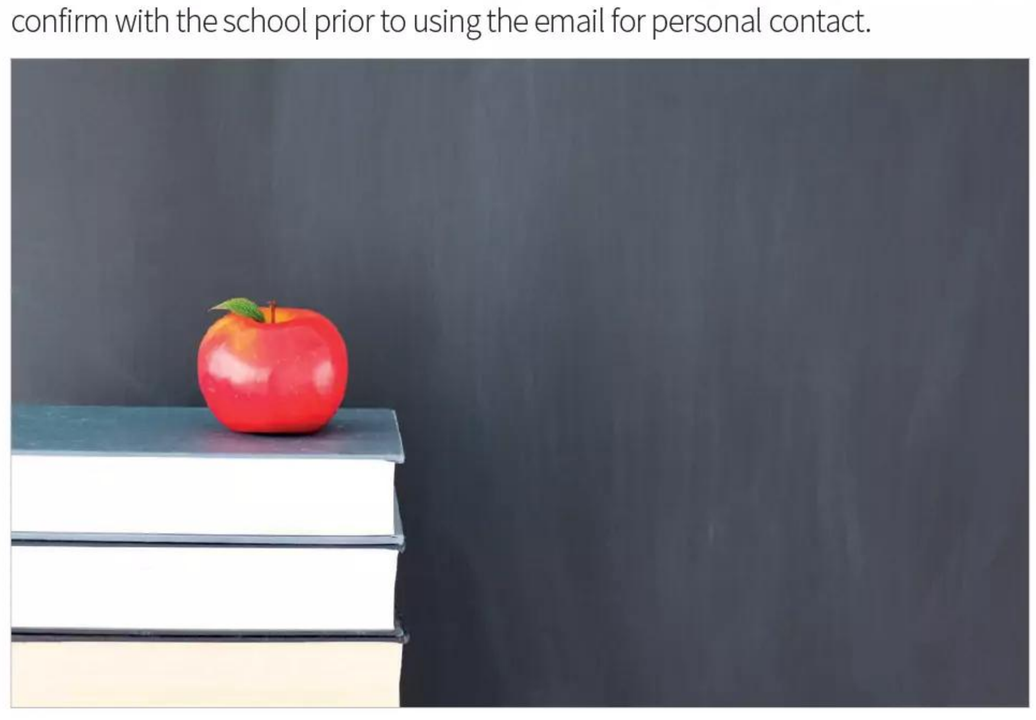
FAMILY LINK

Part of the services offered by Google, Family Link can help you set up a Gmail-like account for children under the age of thirteen. You need to be located in the US for the moment but the service offers improved controls for Android devices and apps and there are considerations for moving the service outside of the US in time.



SCHOOL EMAIL

Here's an interesting suggestion, why not use the child's school email? Providing the school is willing to participate, a child can log into their account from home and using the elevated security, send and receive emails in total safety. Naturally, you'd need to confirm with the school prior to using the email for personal contact.



Cyberbullying

Cyberbullying is when someone uses the Internet, email, online gaming, social media and any other kind of digital platform to threaten, tease, humiliate or upset someone else. Both the bully and the victim of the bullying can be any age, from very young children up to late teens, and beyond in some cases. The source of the bullying can come from others the victim knows at school or college, or from a complete stranger on the other side of the world.

Bullying someone online doesn't always involve threating remarks. What may seem like a playful comment on one side, could be taken as a cutting jibe on the other. It's not always an easy thing to specify, as we all have moments when we may say or do something to upset someone without meaning to do that person any emotional harm. Mostly though, with respect to a loose and throw-away comment, the one who made the comment will probably apologise for their mistake once they realise that they have upset the other person.

However, true cyberbullying is the persistent harassment of an individual. The cyberbully will goad, threaten, send nasty messages, even take images of the victim and Photoshop them in inappropriate situations, through the use of many different forms of online communications.

It's a sad case too, that a lot of young people are already in a heightened emotional state due to their body image, thanks to the media and unrealistic Photoshopping of celebrities. Where young people, especially young teens, are very conscious of their image, a slight remark to someone can impact the young person in an incredibly negative way.

Social Media

Probably one of the main platforms for cyberbullying, social media is an ideal hunting ground for the cyberbully. The effects of social media bullying have been devastating on some families. Teen suicides, self harm and elevated cases of depression amongst young people are popular in the media and bring to light just how powerful and dangerous social media is as a communications tool.

Facebook, Twitter, Instagram and other examples have all become the haunt of those who prey upon and harass others. From the point of view of a child, whose emotional state is quite vulnerable, even a simple 'like' of a comment can embarrass or hurt.

Online Gaming

Another prime source of modern cyberbullying, online gaming has proved to be a vicious place to inhabit for some. The problem with online gaming is that the bullying comes from anywhere in the world. There are cases of gamers targeting females, different religions or those who come from different parts of the world. With the use of headsets, the gaming cyberbullies are able to shout threats and taunt other gamers, rallying others around them until the victims feel overwhelmed by bullies.

There are numerous games which have adopted a more sport-friendly approach, introducing policies whereby instances of bulling can be reported and the bullies themselves have their gaming accounts suspended. Often online gaming bullying is just someone shouting 'noob' at another, degrading the victim as a newcomer, or someone who isn't as good as them. Other times the bully will say things like 'I hope you die' or 'I'm coming to kill you', or something similar. In short, any abusive behaviour, including destroying your online game creations or belongings, is a form of bullying.

Text Messaging

With more and more young people having access to their own phones or tablets, abusive text messaging is becoming a major issue. Messages sent can, thankfully, be easily traced back to the source, and together with anyone else who was involved, the bully(s) can be reprimanded for their behaviour. Sadly though, there are ways to hide texts and with such knowledge, a cyberbully is able to send their abusive texts anonymously.

Another aspect of cyberbullying via text message is sexting. This is when someone takes an explicit image or video of themselves and sends it to someone else. Sometimes, a person can bully someone into sending them images or videos of the victim, then send those images on to others or upload them to popular sites and inform an entire group of their location.

Email

Sending abusive emails is a large area of concern for those involved in protecting young people from cyberbullying. We've seen, the double-edged blade of anonymity can cut both ways: it can protect your identity online but it also hide an individual who is bullying someone. Anonymous emails sent from a bully can be just as harmful as social media, online gaming and texting. It's a more personal form of bullying, much like having an abusive letter addressed and posted directly to you.

Setting up filters to block certain senders does work but only to a small degree. There are plenty of email services available that will hide a sender or fake email providers to hide behind. It's not always abusive content either, as cyberbullies have been known to send viruses and other malware via email to their victims.

Cyberbullying covers many different forms and platforms. It can be a single, throw-away comment, a like on a Facebook comment or just someone calling someone else a 'noob'. It can also be very serious indeed, including death threats, threats of violence or the sending or posting of explicit images or videos. There's a wealth of information available from the likes of the NSPCC and Childline with regards to cyberbullying, which is certainly worth reading through if you suspect any instances of bullying or you just want to know more about how it works online.

How to Prevent and Deal with Cyberbullying

We will never be able to truly stop cyberbullying, or any other form of bullying, from happening, as there will always be those who want to cause harm to others. However, we can take steps to prevent its effects, cope and deal with it.

Coping with face-to-face bullying can usually stop when the victim is home or at a place where they feel safe. On the other hand it often feels like there's no escape from cyberbullying as the online world is always present, and even when you cut yourself off from any online activities, the bullying still continues.

> *"Coping with Cyberbullying"*

The level of how upset a victim of cyberbullying feels depends greatly on the person. Some can easily shake it off or deal with it by immersing themselves in a sport, book, family or something else. Others though, take any form of abusive message, comment and such to heart and its affects can range from crying to feeling suicidal. There's a lot that goes on in between and it's difficult even for professionals and experts to say how to react and cope with cyberbullying.

However, there are some guidelines which we can help children and young people through when it comes to dealing with cyberbullying:

It's not your fault – If someone is repeatedly cruel to you, you must not blame yourself. Two people can have an argument but if the other person continually abuses you in some form, then that's bullying and is not acceptable.

Don't respond – No matter how easy or tempting it is to respond to a cyberbully, it's recommended that the young person doesn't. Often, a cyberbully is goading the victim for a response, it's a form of psychology that enables them to think they have power over the victim.

Save all evidence – It's important that the young person saves or records all the evidence of cyberbullying. This evidence can then be used to show a parent or guardian, teacher or relative, or even someone responsible for the platform where the bullying took place. This way action can be taken to prevent any escalation.

Always ask for help – Even if the bullying incident seems minor, such as a throw-away comment, it's always best for the young person involved to tell their parent or guardian. We, as adults, can then help the young person deal with the bullying.

Measure your response – It's very easy as a parent or guardian to make a knee-jerk reaction to someone who's cyberbullying our child. Therefore it's often best to take evidence, then perhaps contact someone else, such as the NSPCC or local councillor to see what they as professionals recommend as a gauged response.

Take time to listen – A young person coming to an adult for help on bullying is a huge step for them. It's easy to close up as a child, so to take that step should be worthy of your full attention. Listen to everything they have to say and together find a way to prevent and deal with the cyberbullies.

Help restore self-respect – The ultimate goal in any bullying is help restore self-respect to the victim. The more self-respect the young person has, then the better they are able to cope with future bullies, and life itself.

Stay positive – Bullying should be stopped but it's unlikely as humans will never be able to eradicate all forms of cruelty toward others. With that in mind, it's best to remain positive for the young person, whilst still being realistic. It will help them mature and learn to form protection techniques against those who want to cause suffering.

Ask the person to stop – Whilst one of the guidelines is to never respond, there is the option to take a simple approach and ask the person who's bullying to stop. Sometimes a hurtful comment could be easily rectified by the sender, simply by it being shown that it was unnecessarily cruel. In the ideal world, they will apologise and remove the comment. It depends greatly on the comment and bullying in question.

Use the tools available – Use the available filters, blocks and reporting mechanisms available to stop the cyberbully from even being able to contact you. Facebook, Twitter and so on can block users and you're able to report abusive behaviour. Likewise, online gaming can ban an account or kick a bully from the game server.

Report serious threats – Not only should you report threats to parents and guardians, it's recommended that you should report serious physical, sexual and violent threats to the police. Each case will be treated with respect and the police have powers to approach the bully with the evidence to caution or charge.

Whilst the above will help children, young people, parents and guardians with cyberbullying, it's sadly not something that's going to disappear overnight. The moment you're online, you're open to some form of abusive behaviour and every social media, online game and contact made increases the chances of cyberbullying from occurring. The best we can do is help young people cope with it and learn to avoid those who would want to abuse.

Helping Your Child Through the Internet

The Internet is a vast resource that's full of amazing details and an equal amount of villainy and inappropriate content. It's difficult for a child to navigate it by themselves and extremely dangerous; so, as a parent or guardian, we need to make sure they're safe.

Internet Safety for Everyone

Together with the excellent advice from the NSPCC, Childline and Safety Net Kids, we've collated ten practical and realistic tips to help you and your child remain safe when using the Internet and its connected services.

PERSONAL INFORMATION

Never post any personal information online. Keep your postal address, email address, phone numbers and, if possible, names away from public viewing. Especially never tell anyone you've just met online, in a game or chat room any details about yourself.

PHOTOGRAPHS

Consider carefully before posting any pictures of yourself online. Once an image is available on the Internet, it's extremely difficult to get rid of any trace of it; and should someone have already downloaded it on to their computer, it's impossible to locate and trace.

STRANGER DANGER

People you don't know in the real world are strangers and not always who they say they are. The same applies for the online world. Not everyone you meet in an online game is who they claim to be, so treat every contact as a stranger and be wary of them.

INAPPROPRIATE CONTENT

If you see or hear something online that upsets you or makes you feel uncomfortable, you must tell a parent, guardian or teacher as soon as you can. If possible, show them the content that's upset you and tell them why it's upsetting. Talking to a parent or teacher will help you gain a better understanding of the world around you.

COMMENTS

Always think before you enter any comments online. Remember, they can be hurtful to someone else or be inappropriate without you even realising it. The comments could also lead someone to taking an interest in you, if you enter your age for example.

ACCOMPANIED VIEWING

Parents, always make sure that young children are accompanied when navigating the Internet. Ensure that the privacy and security settings are as high as possible and that they don't have access to sites beyond what you specify, should you need to leave their side for a moment.

SECURE PASSWORD

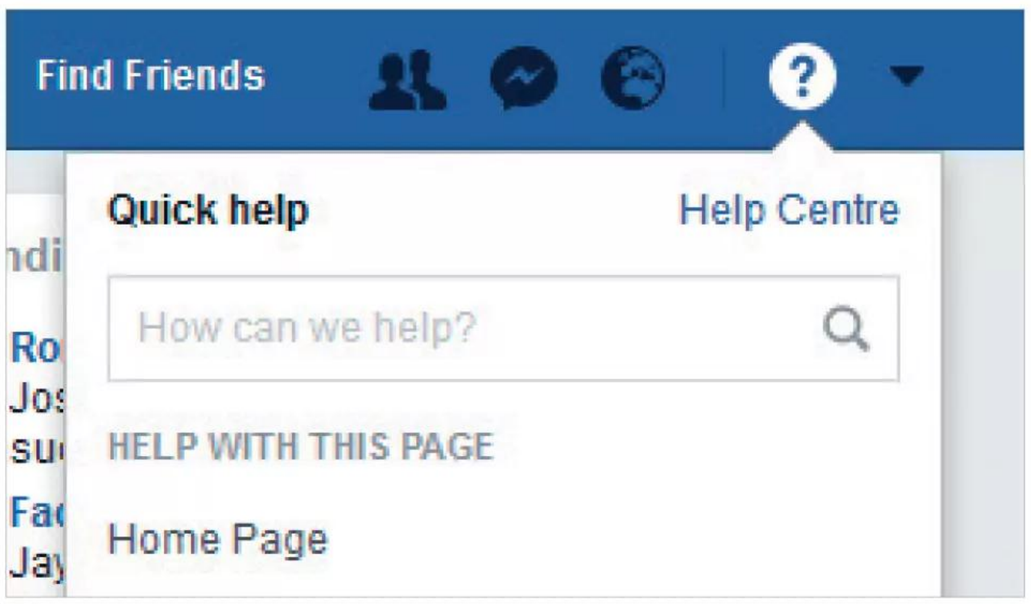
Never give out your password online, even if the email or message is claiming to be from the bank or someone you know. Never let anyone remotely attach to your computer either. It's very rare for a company to attach to a home computer to fix something. At least be suspicious of anyone asking to connect remotely.

IGNORE BULLYING

Try not to reply to anyone who's appearing to bully you online. They are most likely trying to goad you into responding and will keep pushing until you finally crack and respond. Most of all, never respond out of anger. If it's getting too much, leave the site or game and come back later.

SOCIAL SAFETY

Whether you're on a social media site, in a chat room or playing a game, become familiar with the safety settings: how to turn off chat and how to block or report another user for any abusive content they may post. Take screenshots if possible, so you have evidence to back up your claim.



NEVER MEET

Never arrange to meet up with anyone you've met online, even if you're an older teenager. It's very easy to pretend to be someone, post a fake picture or take the identity of someone else. If you do arrange a meeting, make sure you're with other friends, in a public place and let others know where you are going.

Your Child and Online Gaming, is it Safe?

Gaming has taken some interesting leaps in technology since the days of feeding money into the arcade cabinets. However, with those advances comes a new level of online concerns for parents and guardians.

Of course, there's nothing wrong with gaming or online gaming. Despite the many years of people bemoaning that gaming is taking away something from a childhood, recent studies have actually shown that online gaming can increase social skills, help develop hand-to-eye coordination and, depending on the game, have educational benefits and help young people learn.

The problem is that not everyone always plays fair; some take great offence when they've been beaten by another player, resulting in the person beaten shouting or entering abusive comments. Other players use cheats to gain an advantage, making it near impossible for other players to even have a chance of winning or succeeding. Sometimes, when a player is better than others around them, they can be accused of cheating, even when they're not.

All of the above can be disheartening to a young person and depending on the amount and type of abuse they may receive from a poor loser, quite upsetting too. It's often difficult for someone who enjoys playing a particular game to be accused of something they haven't done or have to contend against someone who is obviously cheating. The trick of course is to keep calm, something many adults find difficult doing under such circumstances, let alone children and young people.

There are other factors too that can cause problems for young people when gaming. The game itself might not be age appropriate, with in-game missions asking the young person to do something that's really not very nice. The game might involve some scenes of an inappropriate nature, perhaps sexually explicit or extremely violent, or use inappropriate language.

In terms of online bullying, it's not just rage that causes problems. Griefing is a tactic used by some gamers to bully others into making the wrong move or decision in the game. This way, the 'griefer' wins by simply causing as much aggravation as possible, and in turn enrages those around them. It's also not unheard of for entire teams of griefers to band together to bully the opposition into defeat.

In-game spending is a modern cause for concern among parents too. For the young person who enjoys playing the game to have any significant advantage at all, they may need to purchase better items from the in-game store. Often these items will inevitably lead to more items needing purchasing and the cost soon mounts up. Other games make it near impossible to finish without having to pay for something, such as a key to unlock the next level or by having the player buy and download more content (known as a DLC, downloadable content).

The other safety concerns involve those who play games in order to be exposed to young gamers. Minecraft, for example, is a game predominantly played by younger people, so those of a perverse nature may play and use servers where they're interacting with younger people; there's even the possibility of some form of online grooming taking place in situations such as this.

However, despite the safety concerns over online gaming, it's not always bad news. Yes some games do employ tactics to leech more money from the players and other games are simply an excuse for poor behaviour; but with respect, there are countless games available that can help a young person develop social and other skills.

As parents and guardians, we need to make sure that the game the young person is playing is appropriate and, to some degree, useful to them, as well as being enjoyable. We'll look at some tips on staying safe when gaming online over the page but it's worth remembering that even if we find the game somewhat dull, the young person playing it may well be enjoying it. We just need to make sure it's a safe environment for them.

Online is playing a game in real time with other players from around the world. The game can be virtually anything, a shooter, role playing, adventure or something open world, such as Minecraft. The issue with online gaming is that anyone could be the character that's currently playing next to your child's online avatar.

Staying Safe when Gaming Online – Advice for Your Child

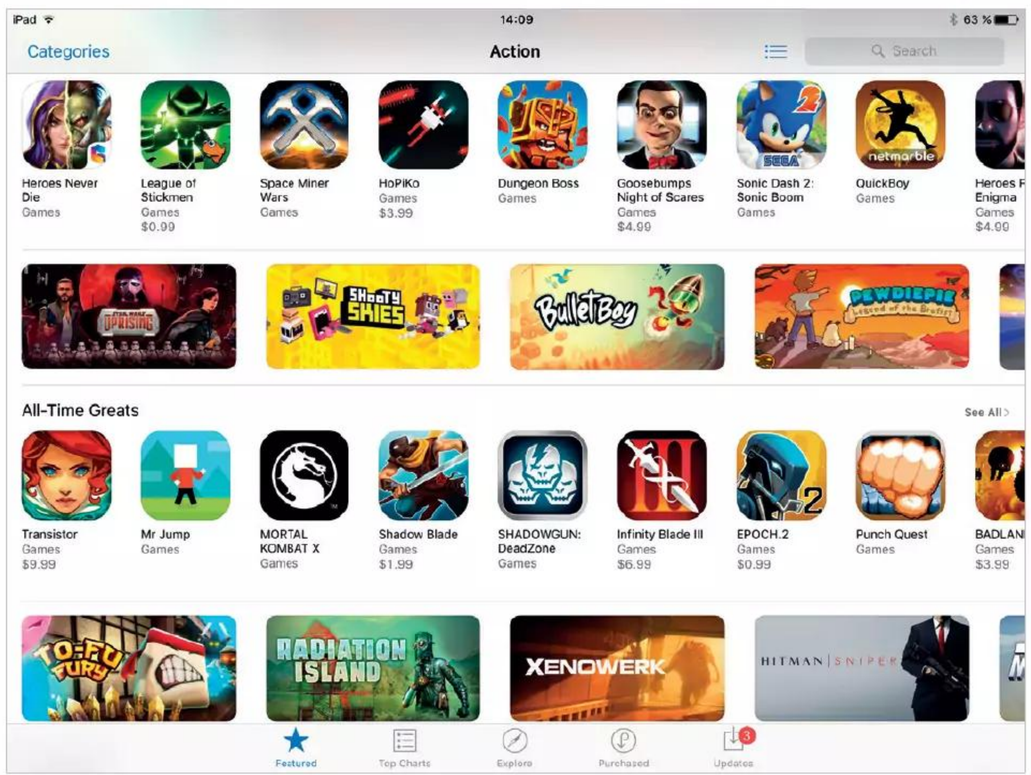
We've looked at the safety concerns of online gaming but what can we as parents and guardians do to help keep our young gamers safe? Thankfully, it's nothing too drastic, just a little common sense and a few tips to help out.

Game On

Here are ten tips to help the young gamer get the best from their game of choice, whilst still remaining safe; also how to avoid any conflicts that may arise from the gaming community.

INVOLVED PARENTS

Parents, take an interest in the online games that your child plays. See what type of game it is and especially see what the online community is like. View the in-game chat, and read the game's forum if it has one to gauge the type of gamers who play it.



AGE APPROPRIATE

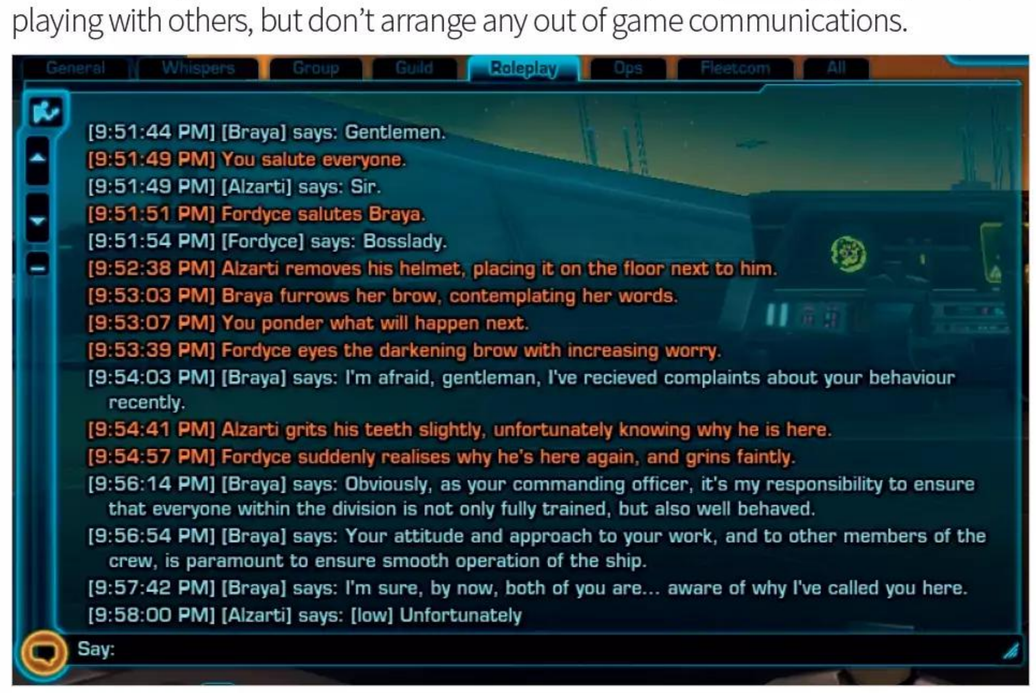
Make sure that game you're playing is age appropriate. Whilst it's fun being nine and playing an 18-rated game, there's bound to be content within that may upset or offend you. There's a reason certain types of game have an age restriction.

IN-GAME SPENDING

However tempting it is to buy an on-game item or DLC, it's not always the best idea. Items like this can be a lure for you to buy another and another, until the cost mounts up and you've racked up a game bill in the hundreds. If you desperately need an item, discuss it with a parent or guardian.

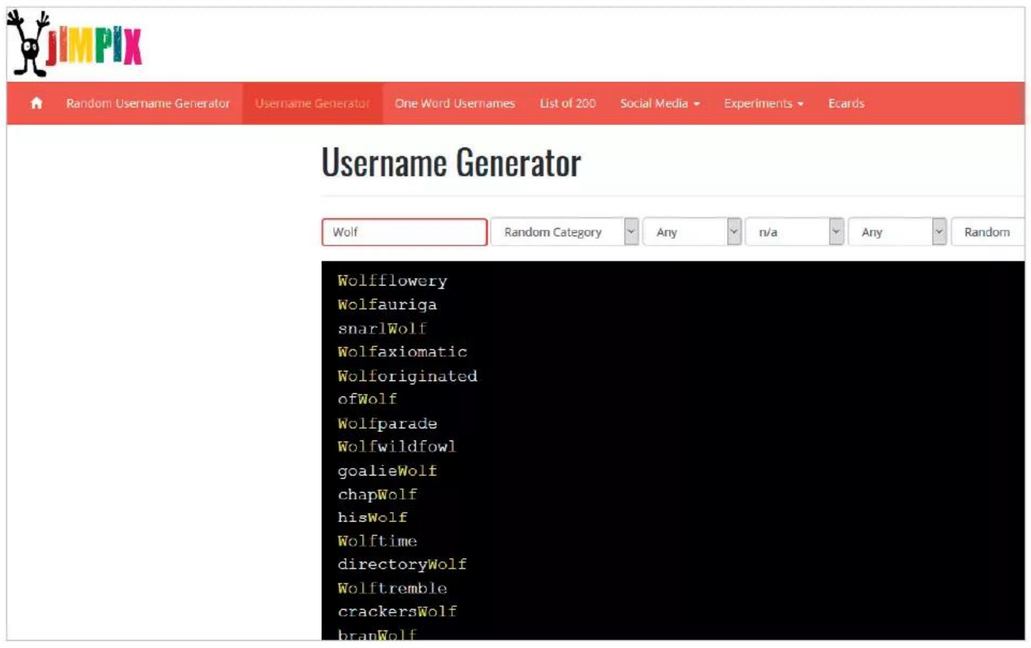
CAREFUL CHATTING

Not everyone in the game is going to be the same age as you. There are some people who are much older and who like to pretend they're a young person. Don't be fooled into becoming a friend with someone who's playing with you. Enjoy the game, and playing with others, but don't arrange any out of game communications.



NOTHING PERSONAL

Never give out any personal details into an in-game chat window, via your headset or in a game's forum. These places are ideal hunting grounds for those who want to use that information to their advantage. Make sure your username isn't linked to you in real life too.

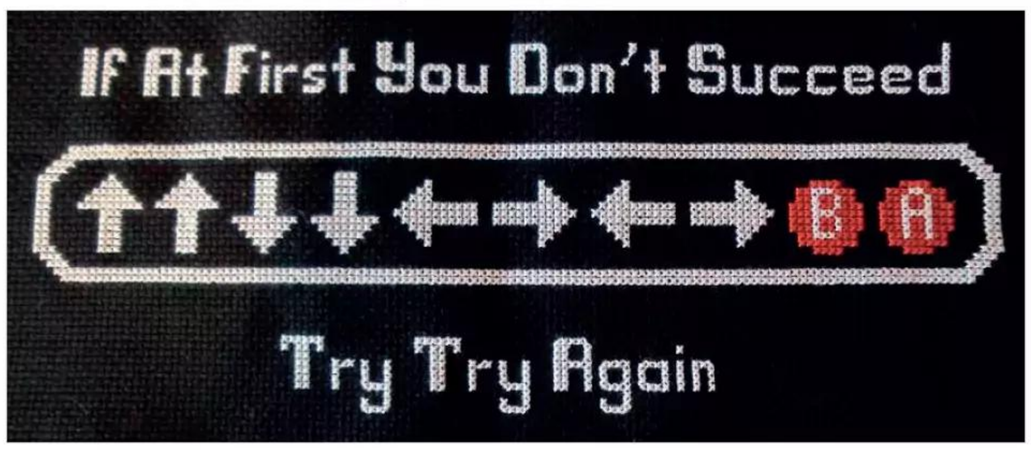


NO GRIEVING

Try not to get angry or be fooled by someone who's being nasty in the game. They could be baiting you, griefing you into making a mistake or simply just a cyberbully who's looking for someone new to inflict misery on. Don't react to anyone calling you a noob, loser or any such wording.

AVOID CHEATING

Cheats are everywhere. Even in the most secure game, there will be a time when someone releases a cheat code that can grant them immortality, infinite items or something else that enables them to win all the time. If you can, record their activity and report them to the game server admins.



AVOID HACKING

Don't attempt to download or sign up for a site that claims to give you an in-game advantage or cheat. Some downloads and sites contain malware payloads or are trying to scam you in some way. Whilst it's tempting to have the advantage, it's nearly always some form of phishing scam.

ALTERNATIVE SERVERS

If you find yourself on a server with cheats, the subject of griefing or other forms of bullying, then leave the server and see if there's another one available without these people present. It might also just be a bad time of day, so try again later on.

WARY TRADING

Be wary of any in-game comments offering a discount on in-game items or trades. Whilst some are legitimate, people wanting to trade one item for another, others are trying to scam you out of real money or in-game cash or items.

Monitoring What's Going On

The temptation and lure of the Internet is often a little too much for some people, especially young people who are repeatedly told not to look or go somewhere on it. Tell a young person not to open a box and most will lift the lid when you're not around.

The tech-savvy youngsters of today will already have a better idea of how to circumvent technological restrictions that we've put in place. We're not saying they're hacking or do anything particularly bad, it's just that sometimes we need to see what all the fuss is about ourselves, rather than take someone else's word for it. Here then, are some of the tricks that the modern, digitally capable young person can do to hide what they look at on the Internet.

Private Browsing

Private browsing, privacy mode or incognito mode is a feature built into every browser, regardless of the computer or device's operating system. It is, as the title suggests, a privacy feature that will disable the browsing history and web cache; it stops any data from the browsing activities from being stored on the device or computer.

With private browsing mode enabled, which takes just a couple of clicks of the mouse, someone can effectively run a search for something they shouldn't, view the content and close down the private browser window without anyone ever knowing they were on the site. There are ways and means in which you can check for private browsing but it's often hit and miss and not entirely accurate, which is the whole point of private browsing in the first place.

Webmail

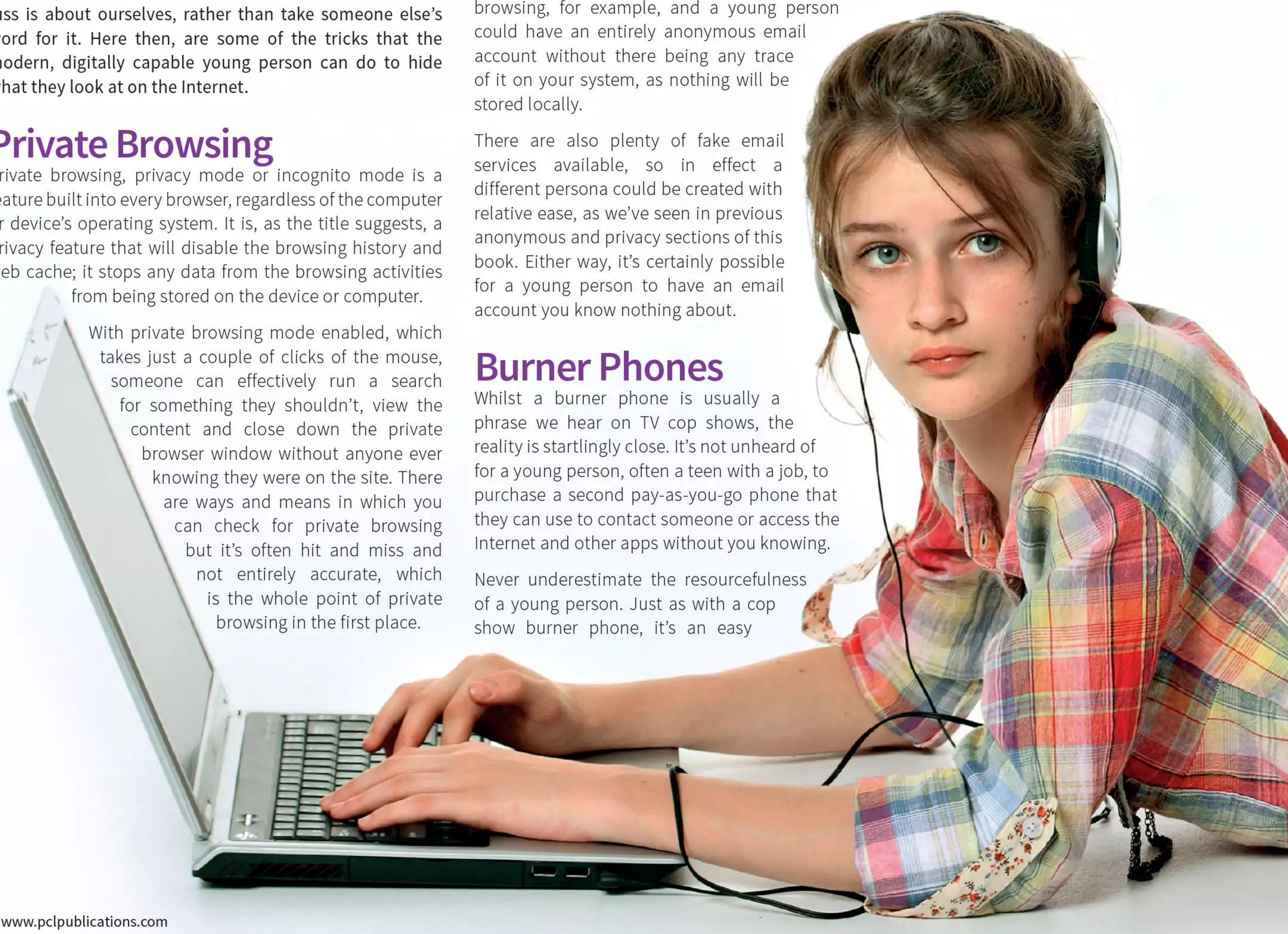
It's easy enough for someone to create a webmail account, such as Yahoo or Gmail and use it without anyone knowing of its existence. Combine a webmail account with private browsing, for example, and a young person could have an entirely anonymous email account without there being any trace of it on your system, as nothing will be stored locally.

There are also plenty of fake email services available, so in effect a different persona could be created with relative ease, as we've seen in previous anonymous and privacy sections of this book. Either way, it's certainly possible for a young person to have an email account you know nothing about.

Burner Phones

Whilst a burner phone is usually a phrase we hear on TV cop shows, the reality is startlingly close. It's not unheard of for a young person, often a teen with a job, to purchase a second pay-as-you-go phone that they can use to contact someone or access the Internet and other apps without you knowing.

Never underestimate the resourcefulness of a young person. Just as with a cop show burner phone, it's an easy



enough device to hide from a parent or guardian. Naturally there's a limit to what a young person can get away with but it's something worth keeping in mind. Another of the many elements to look out for with a young person who's being groomed, is a burner phone the groomer may give to them. This way, they're able to contact the young person with a higher degree of anonymity.

Secret Social Media

When used with an unknown webmail address, and private browsing, it's an easy task to create a secret social media account. Try it yourself and see how far you can get using Twitter and Facebook and the like.

Despite the fact that creating a fake social media account is against the social media platform's rules, it's not something they're able to police with any great efficiency. Just like a secret email, it's extremely difficult to see if a young person has set up a secret social media account.

OS on a stick

It's possible to have an entire operating system on a USB stick and be able to boot into the OS outside the system that's installed on the computer. This makes for an impressively anonymous and secure platform to browse from, as everything is done via the USB stick and the temporary session held in memory.

Naturally, the young person will need to reboot the computer and boot into the OS on the USB drive but that takes mere seconds these days. The end result is something you'll never likely be aware of.

Of course, we're not saying you should police your children like a prison warden. There will come a point where you simply have to have faith that you've taught them right from wrong and let them go and discover the world by themselves, however painful that may be. There's a fine line between protection and controlling and its borders are ever shifting thanks to the technology available and the ever-growing curiosity of young people.

However, we can make sure that a young person is educated and Internet-wise enough to be able to make decisions for themselves; and, as you would expect, we also need to ensure that they're not the victim of any digital attack. An open relationship is credited as being the key here, as often stated by professional bodies.

Human nature finds most of us sneaking a peek at something we shouldn't and children and young people are certainly no different. Young children will

> ***"Eyes in the Back of Your Head"***

most likely avoid those areas on the Internet the parent or guardian has told them to never go to; however, older children and teens may find it a little too tempting.

Monitoring Online Activity for Non-Technical Guardians

There's a vast difference between monitoring a child's online activity and actively spying on everything they do. In monitoring, you're making sure that they aren't being scammed, downloading anything illegal and generally behaving themselves online.

Non-Technical Tips for Monitoring

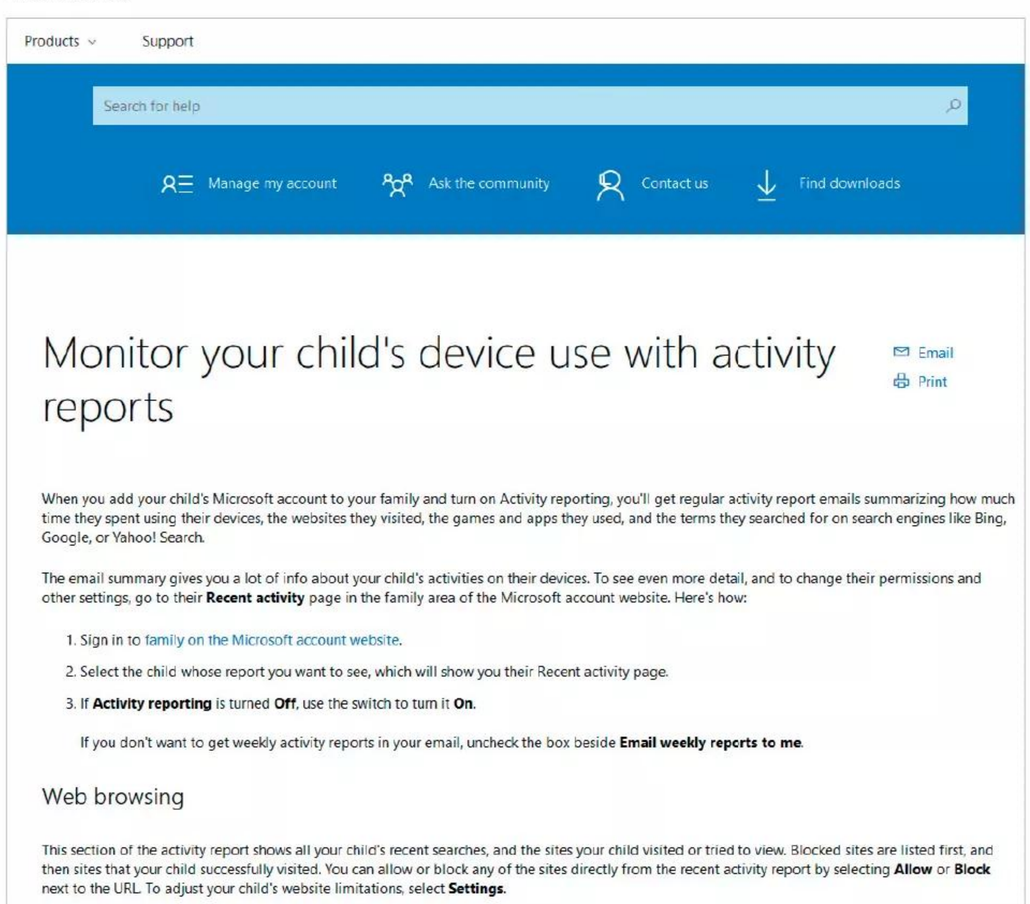
There are numerous ways to monitor a child's online safety but a lot of them can be quite technical. Instead, here are ten tips for those who aren't as computer literate but still want to help keep a child safe online.

DEFINE RULES

First off, set some rules. Don't use the Internet alone in your room, don't chat with anyone online, don't enter your full name or address online, don't click on any links, don't open any attachments, and talk if you see something that's upsetting. Common sense rules will go a long way to ensuring online safety.

FAMILY ACCOUNTS

Consider using the Microsoft Family Account as your child's login to Windows. We'll go into more detail as how to set it up and use it a bit later on. For now though, navigate to **https://support.microsoft.com/en-us/help/12441/microsoft-account-monitor-child-device-activity** and see what you can do with a child account in Windows.



ISP HELP

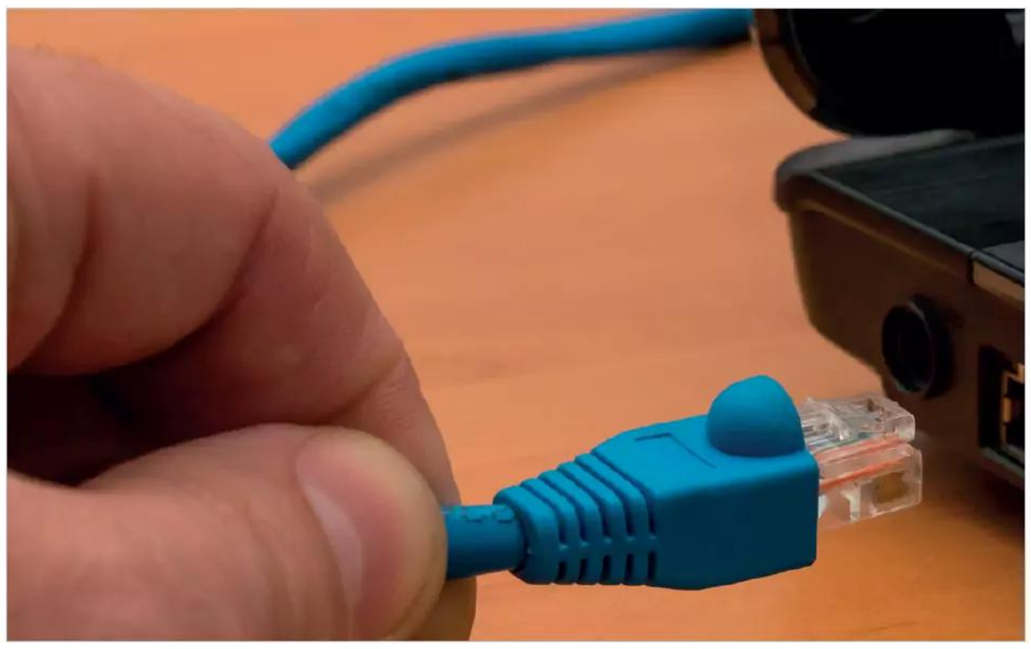
If you require some extra help with monitoring the Internet activity in your home, consider contacting your ISP and chatting with a member of the team. Most, if not all, ISPs will have a dedicated section for online safety, in particular child safety and may be able to set up a web-based monitoring portal for you.

BE PRESENT

Even if there are multiple computers and devices in the home, only allow the child to use one located in a main living area, such as the living room. Somewhere you're likely to be when they're online, so you can keep an eye on them and be at hand if they come across anything.

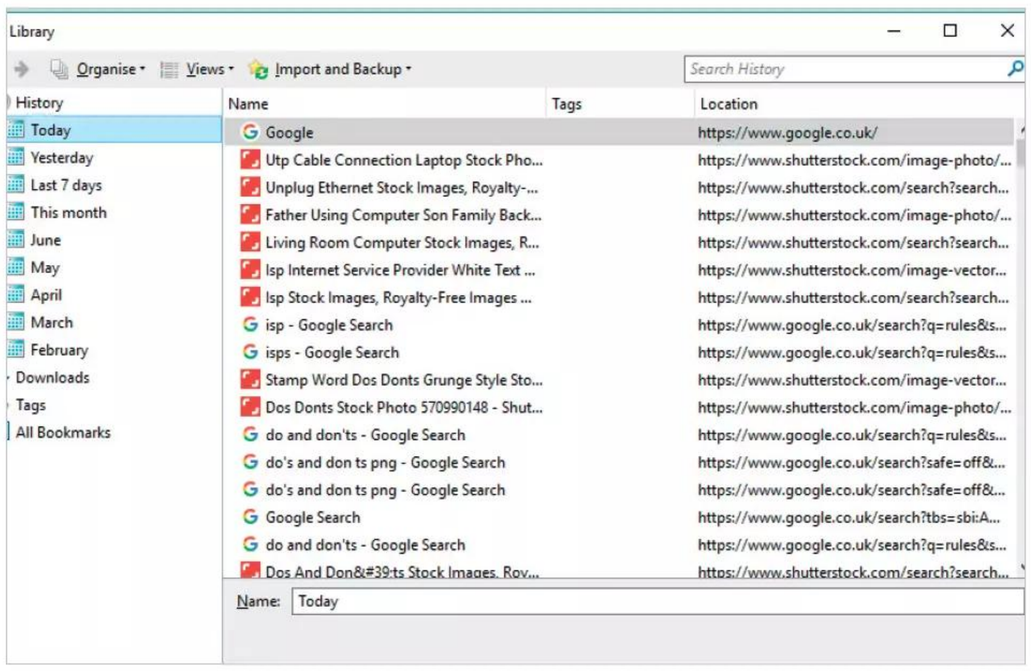
GOING OFFLINE

If your child wants to play a game, one that doesn't involve any online communications, or do some work, consider unplugging the computer or device from the home router. Either pull the cable out of the network port or power down the Wi-Fi. That way they can't get online.



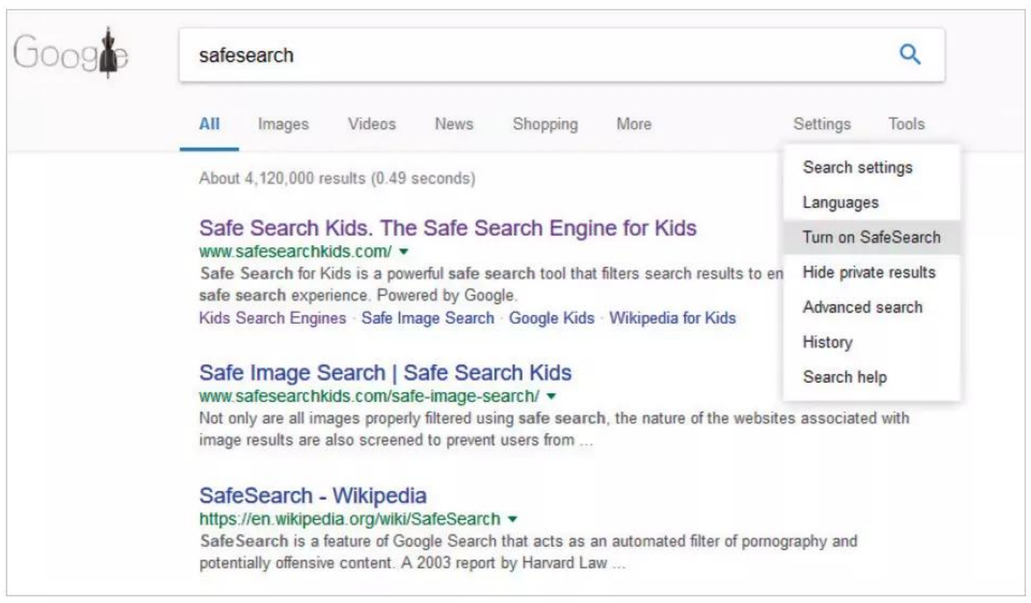
BROWSER HISTORY

After your child has been online, consider taking a look at the browser history. You can find the history among the browser's usual settings, click on the three horizontal bars in the top right of Firefox, for example, followed by History to view the recently visited web pages.



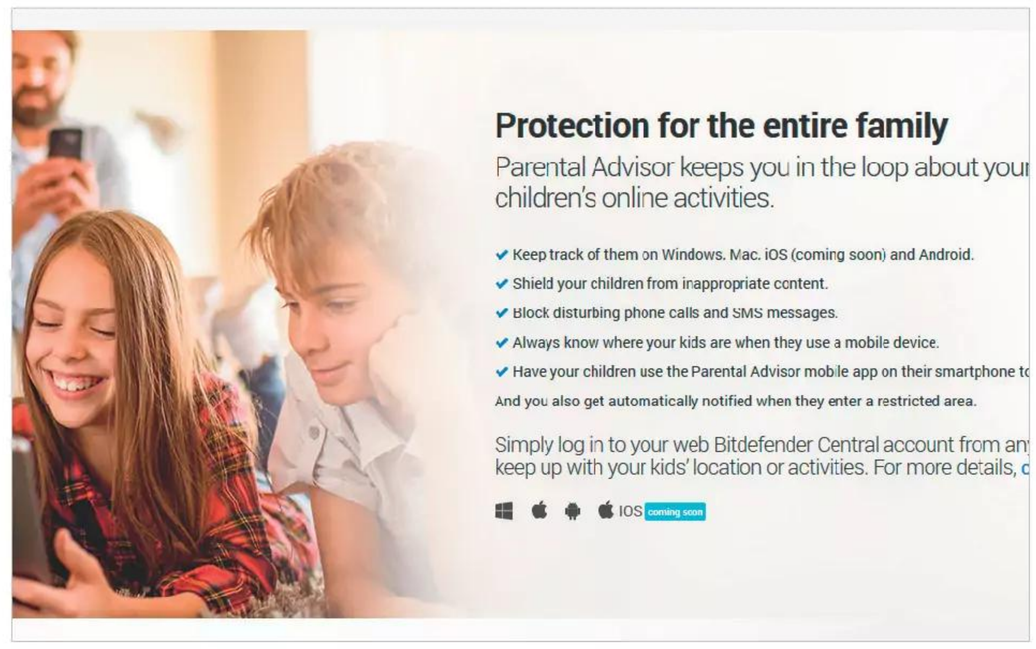
PARENTAL FILTERS

Make sure that any search engines used, such as Google, have the parental filters set to the maximum or strict levels. In Google, enter something in the search box, then click the Settings link and turn on SafeSearch. Other search engines may differ in appearance but they all have some form of customisable filter rule.



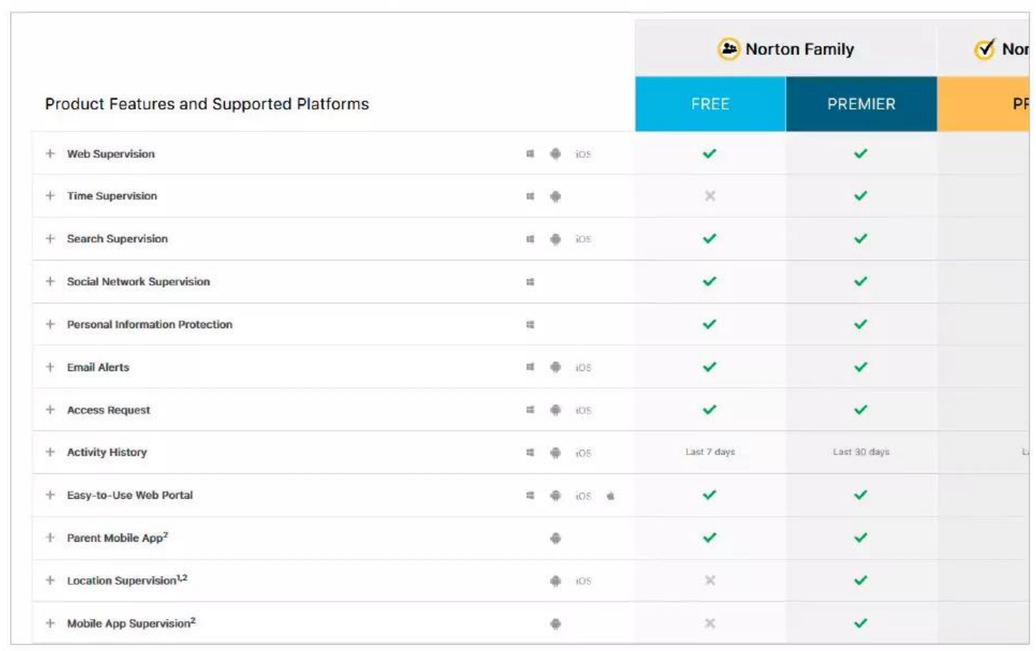
3RD PARTY SECURITY

It's worth investing in a third-party anti-malware security suite, such as Bitdefender. With Bitdefender, and other security suites, you get some form of family protection allowing you to keep track of Internet use, block unknown communications and even extend the protection to mobile devices.



FREE MONITORING

If you don't want to pay for a full suite, consider using a free monitoring and protection tool such as Norton Family Free Edition. With it you can supervise web access, protect personal information and set up social network supervision.



Product Features and Supported Platforms	Norton Family FREE	Norton Family PREMIER	Nor PF
Web Supervision	✓	✓	
Time Supervision	✗	✓	
Search Supervision	✓	✓	
Social Network Supervision	✓	✓	
Personal Information Protection	✓	✓	
Email Alerts	✓	✓	
Access Request	✓	✓	
Activity History	Last 7 days	Last 30 days	
Easy-to-Use Web Portal	✓	✓	
Parent Mobile App[2]	✓	✓	
Location Supervision[1,2]	✗	✓	
Mobile App Supervision[2]	✗	✓	

BECOME FRIENDS

If your child has any social media accounts, make sure to become friends or connected to them. This way you can see what they post, what they like and be ready to help them should something ever get out of hand.

Tips for Technical Guardians to Monitor a Child's Online Activity

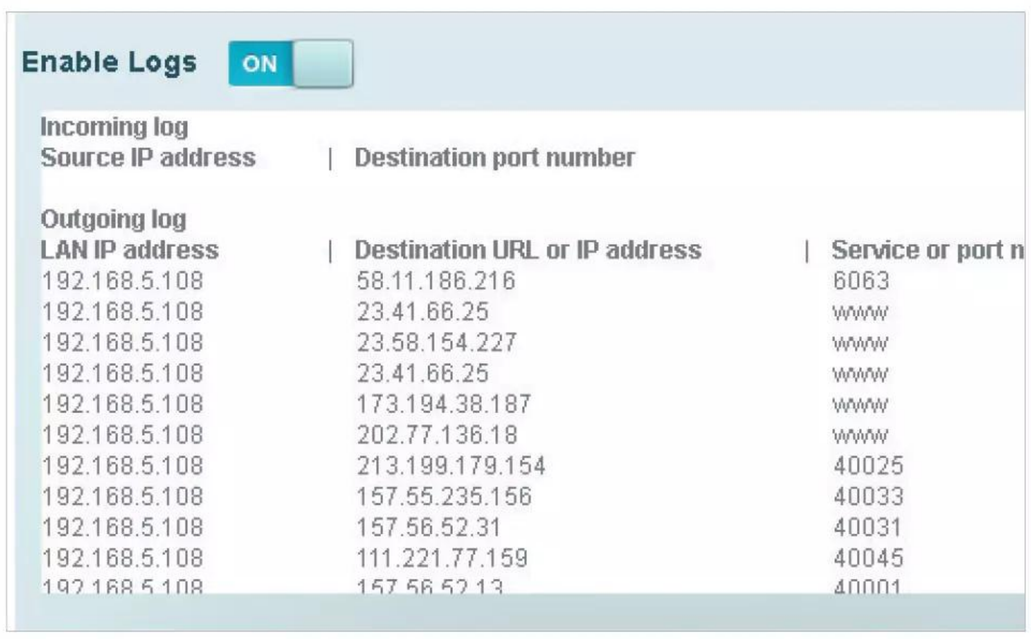
For those parents and guardians who are more technically minded, there's a wealth of software and features available that enable you to monitor your child's Internet activities. Some are simple solutions, others require a little more work, it depends what you're looking for.

Ten Steps for Tech Minded Guardians

As a technically minded parent or guardian, you can monitor traffic, set up batch files to send daily connection reports and fiddle with the inner workings of your router. Here are ten tips to help you out.

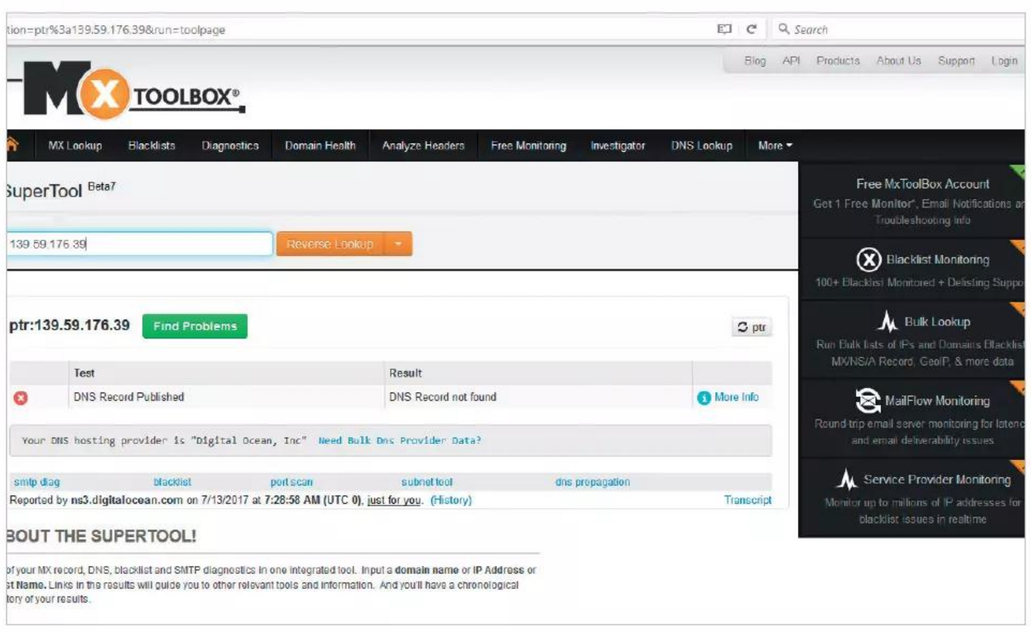
ROUTER LOGS

Depending on the router you own, either one you've bought or the ISP-provided one, there's often a way to log web traffic. The logging can sometimes be a single entry detailing the entire house's activity or you can specify individual devices connected to the router. You need to consult your router guide for more information, or contact your ISP.



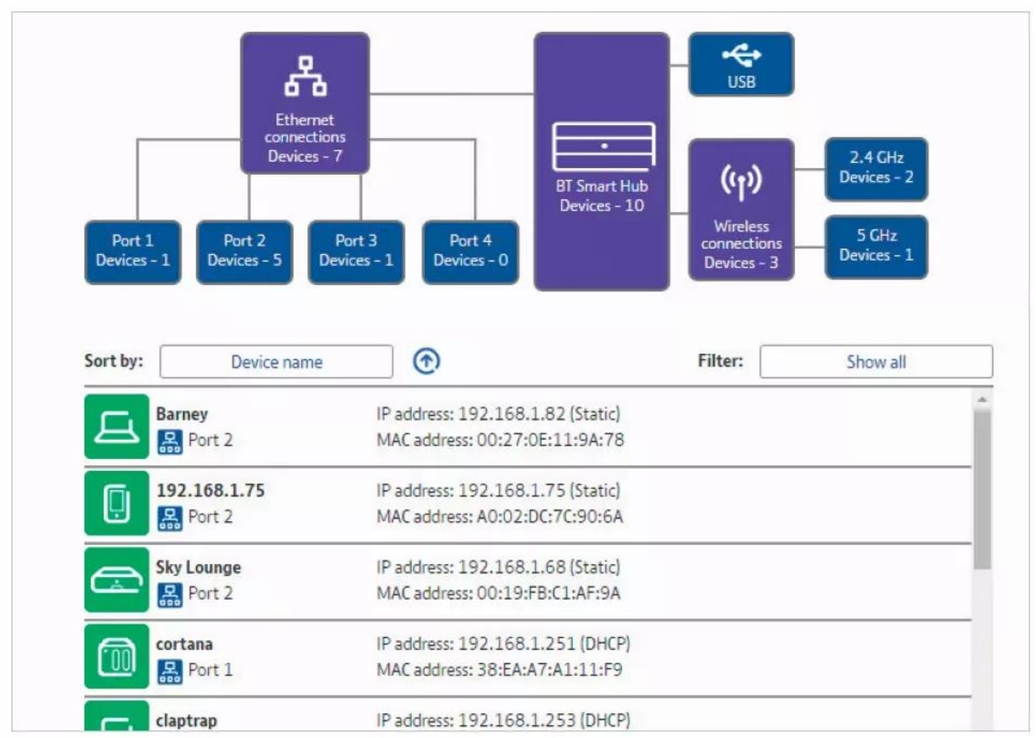
RESOLVE ADDRESSES

If when consulting router logs you have countless IP addresses instead of domain names, you can run the addresses through a reverse IP lookup site. There are dozens available, but MX Toolbox is a good place to start. Enter the IP address and you can see who the hosting company is, and from there ascertain what's being viewed.



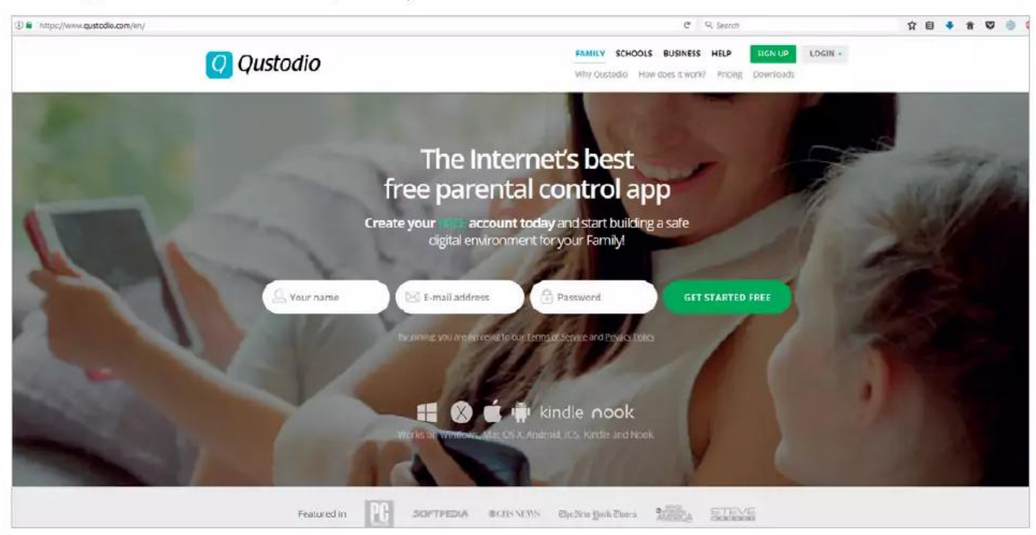
FRIENDLY NAMING

This may seem an obvious step but it's one that often overlooked. If you're going to monitor online activity, you need to make sure that the child's devices are correctly labelled in the router setup. Instead of them being just a string of numbers, take the time to ensure they're labelled as 'Bobby's iPad' and so on.



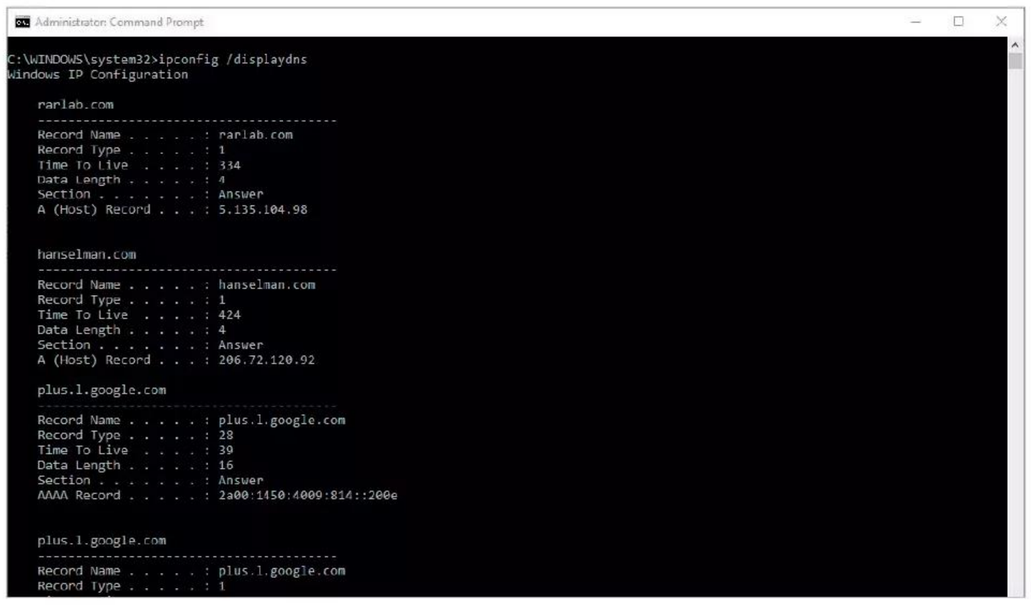
PARENTAL MONITORING

Monitoring software is a must have for parents or guardians who want to limit and control what their children do online. We'll look at some examples over the page but to begin with take a look at Qustodio Parental Control: **https://.qustodio.com/en/**. It's a cross-platform tool for better monitoring of online activity, and it's reasonably well priced.



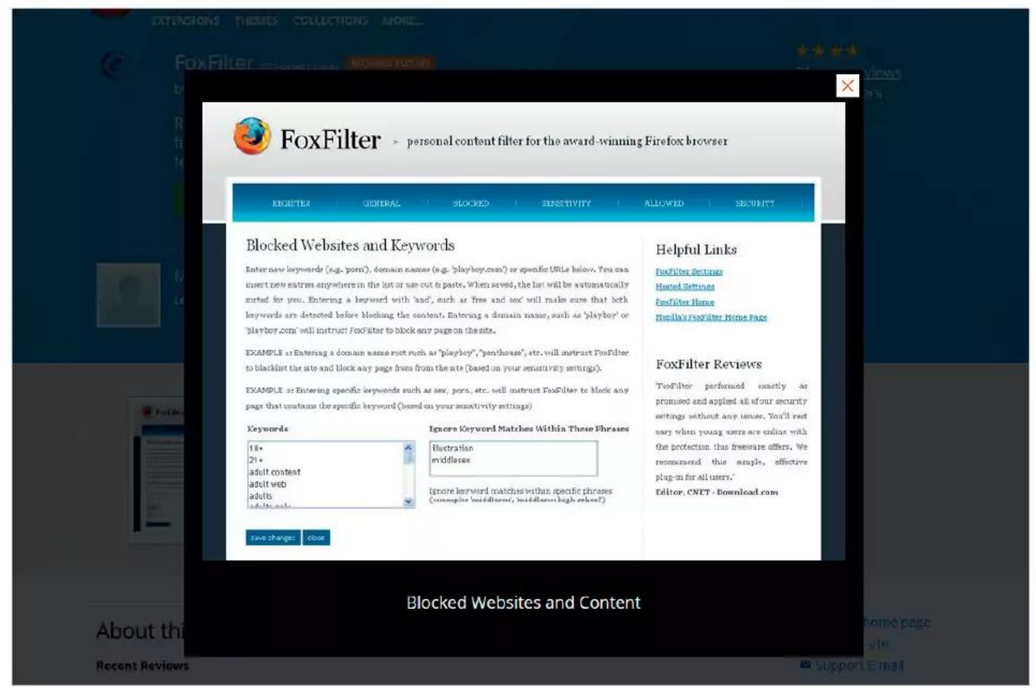
DISPLAY DNS

For those who like to get their hands dirty in the command line, open up CMD from the Windows Start button and enter the command: **ipconfig /displaydns**. This will list the sites visited by the user during their session. If you want, record the sites to a text file for viewing later with, for example: **ipconfig /displaydns > c:\monitoring\sites.txt**.



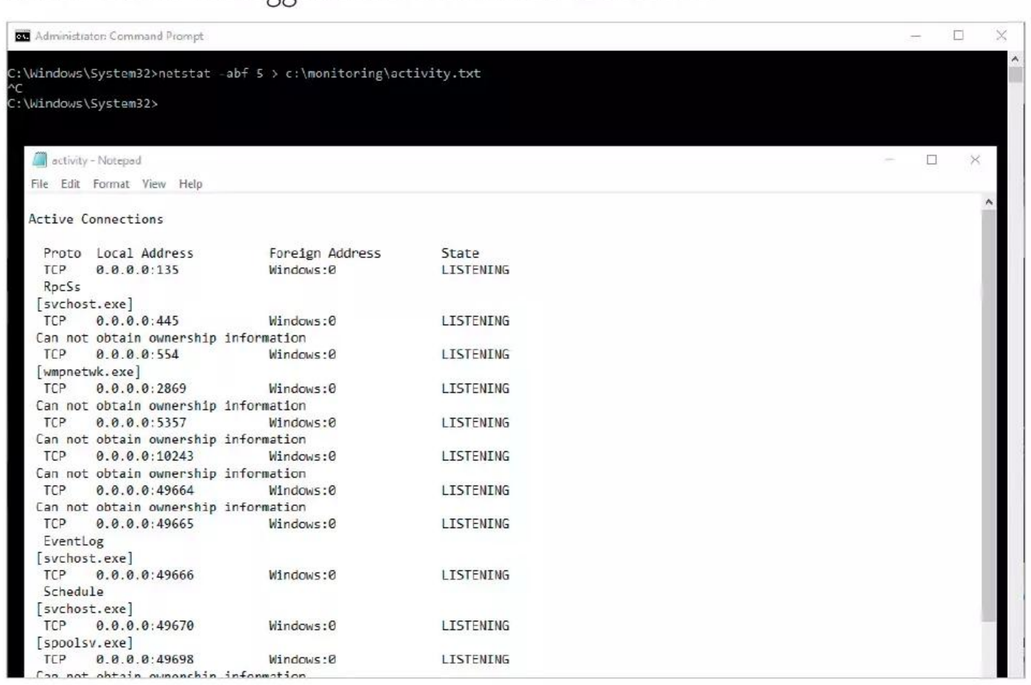
BROWSER CONTROL

If you need a specific monitoring and parental control tool, then consider using FoxFilter for Firefox. This is an add-on that can block customised websites, such as anything containing inappropriate content and report its use in a handy web interface.



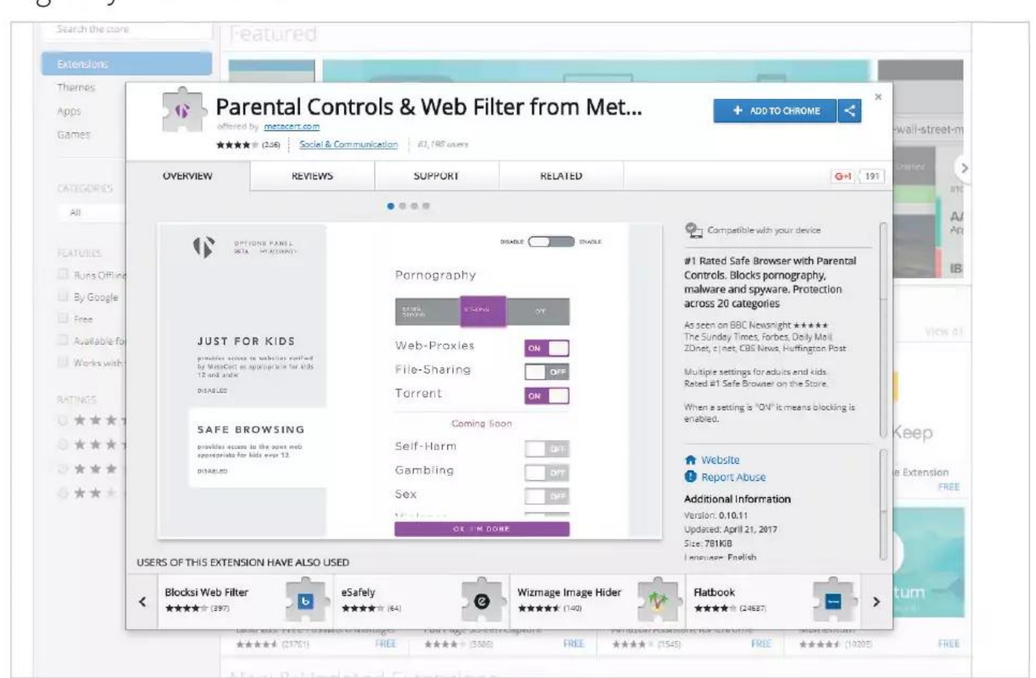
NETSTAT COMMAND

Using the Netstat command that we looked at on page 98, you can enter into a command prompt: **netstat -abf 5 > c:\monitoring\activity.txt**. This will record the entire activity of a session to a file, which you can then browse. The recording will stop once the child has logged out of their Windows account.



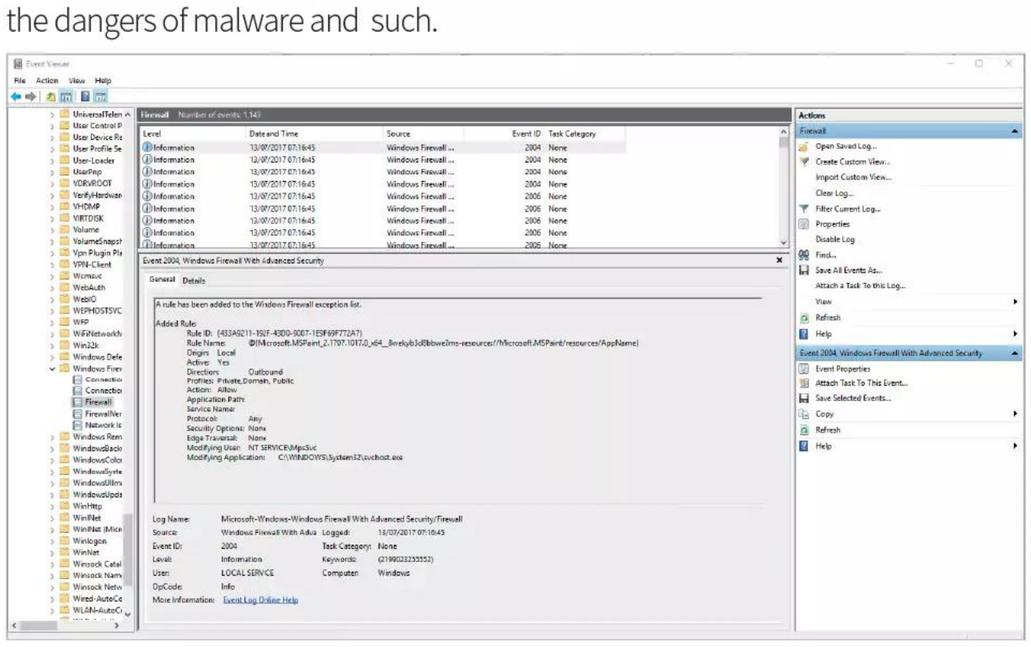
CHROME CONTROL

Users of Chrome can try MetaCert's Parental Controls & Web Filtering add-on. With it you can block certain sites, set profiles and monitor the web activity of your child as they use the browser. There are plenty of features, so it's worth looking over if you regularly use Chrome.



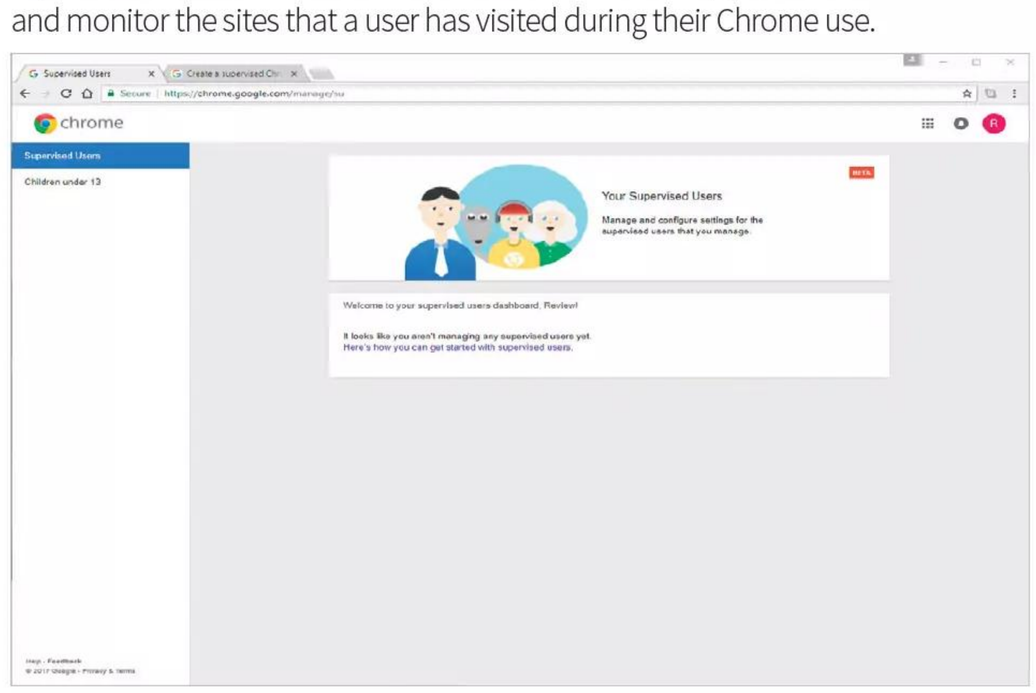
WINDOWS LOGS

Don't forget to check your Windows Event Logs, especially the Windows Firewall Event Log for any activity that may have triggered the Firewall. You can then build up a picture of where the child is visiting that's causing the Firewall to react and educate them in the dangers of malware and such.



SUPERVISED USER

While still on Chrome users, if you visit **http://chrome.com/manage**, you're able to set up a supervised user for the other Chrome accounts. This way you can set restrictions and monitor the sites that a user has visited during their Chrome use.



Ten Monitoring Tools to Install and Use

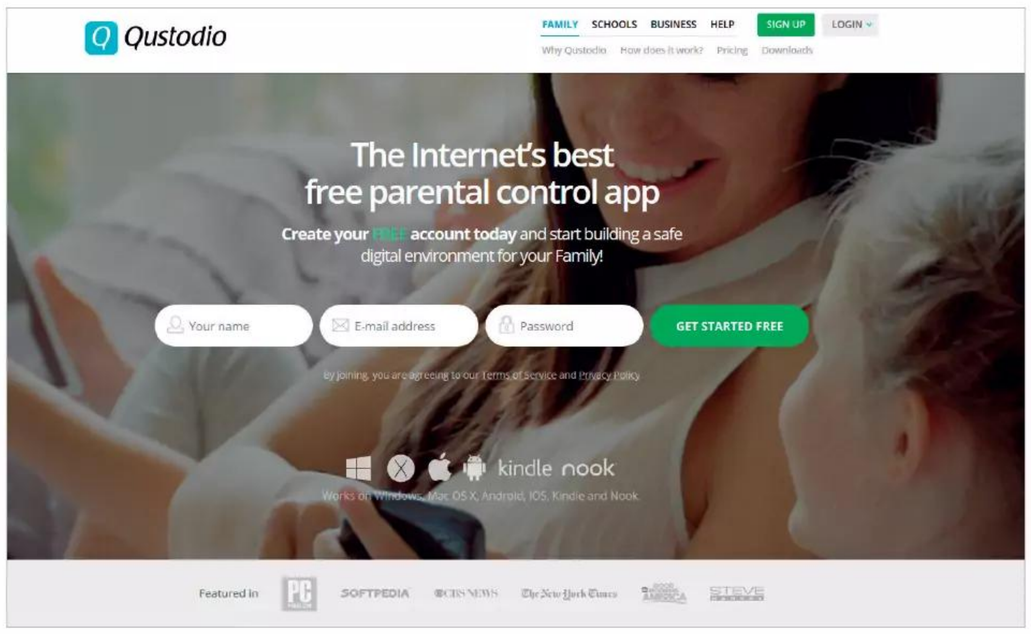
Monitoring tools usually come within a complete Parental Control package. These tools can be dedicated programs, or come as a part of a security suite. Either way, they're excellent ways to help keep children and young people safe on the Internet.

Parental Controls

We've collated ten of the better parental control and monitoring tools and software, in no particular order. Some offer their software for free, others you need to pay for.

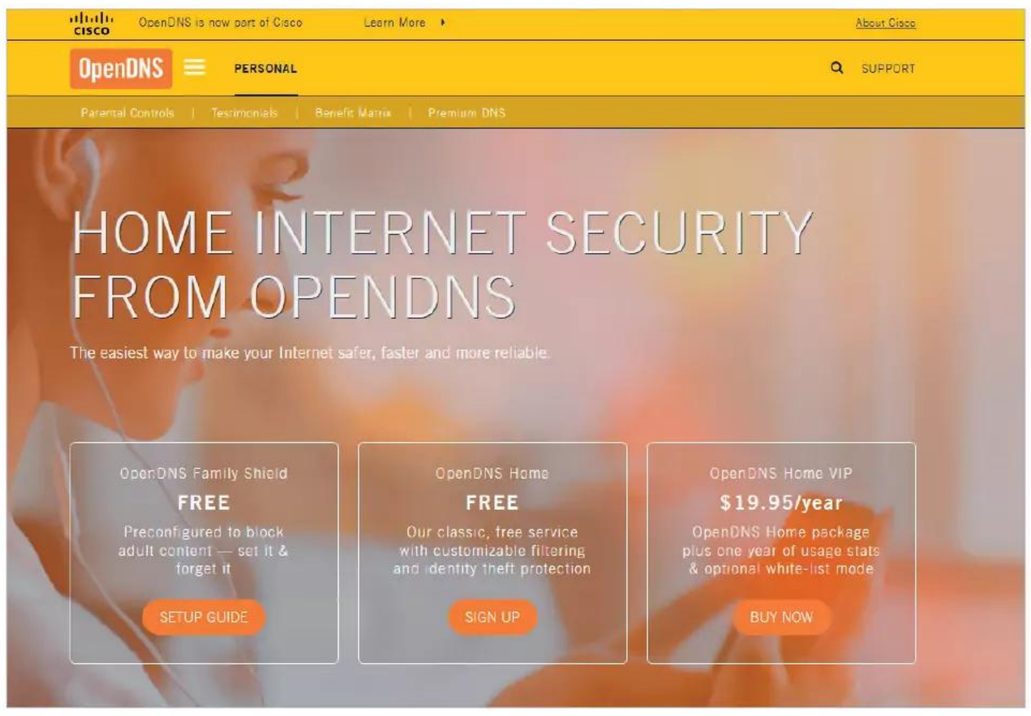
QUSTODIO

We've mentioned Qustodio in the previous page, so it's a good example to kick of this top ten tools section with. Qustodio is a complete package that monitors, blocks, filters and controls times, games and apps across many different platforms. Pricing for up to five devices starts at £32.95 per year.



OPENDNS

OpenDNS from Cisco offers both free and paid-for services to help block inappropriate content across virtually any Internet connected device. You need to set up DNS entries in your router to take advantage of it but full instructions are given via a helpful setup guide.

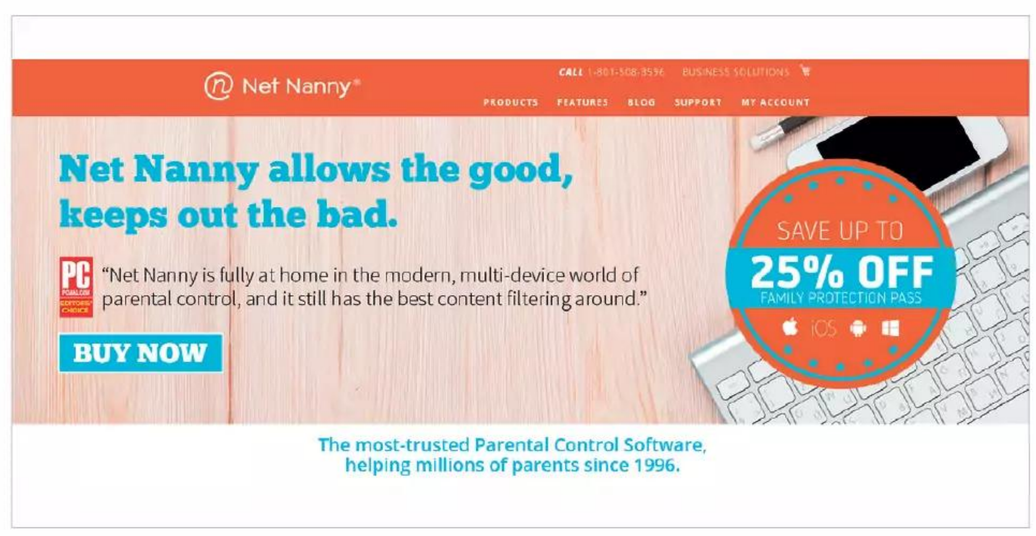


KIDLOGGER

KidLogger is an interesting product that offers a basic, single device with nine days of history for free, moving up to five devices, then ten devices for increasing costs. You can monitor browser activities across Windows, Mac and Android; block apps, take screenshots and limit time, amongst other features.

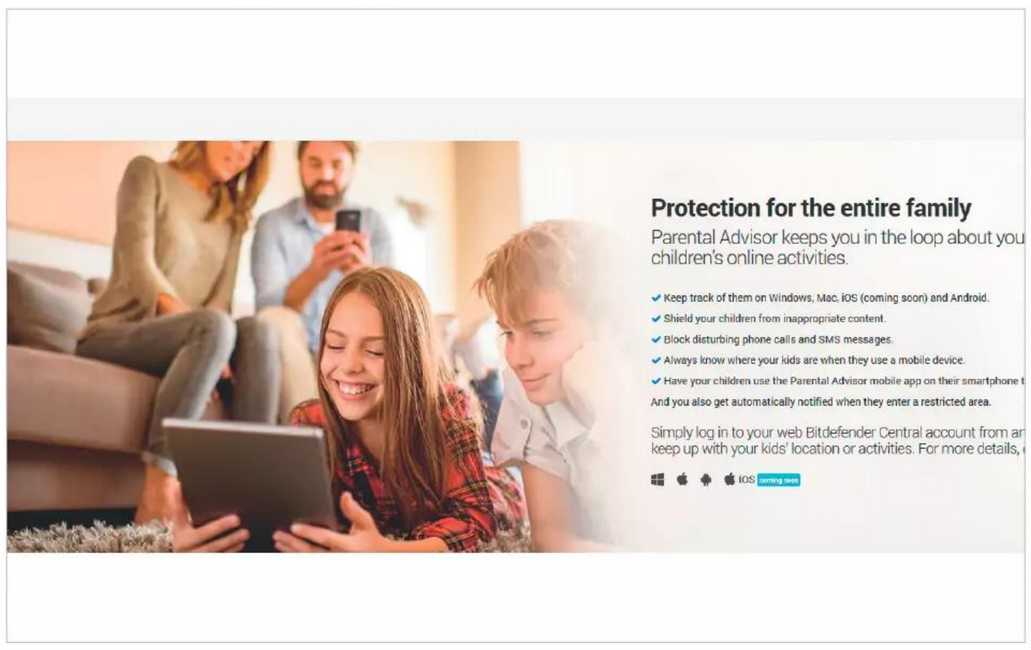
NET NANNY

Without a doubt, one of the most respected parental control solutions available is Net Nanny. It's been around since 1996 and offers unparalleled levels of filtering, protection, monitoring and parental controls. It's cross-platform and prices vary depending on what you want, so it's best to check out the latest offers available.



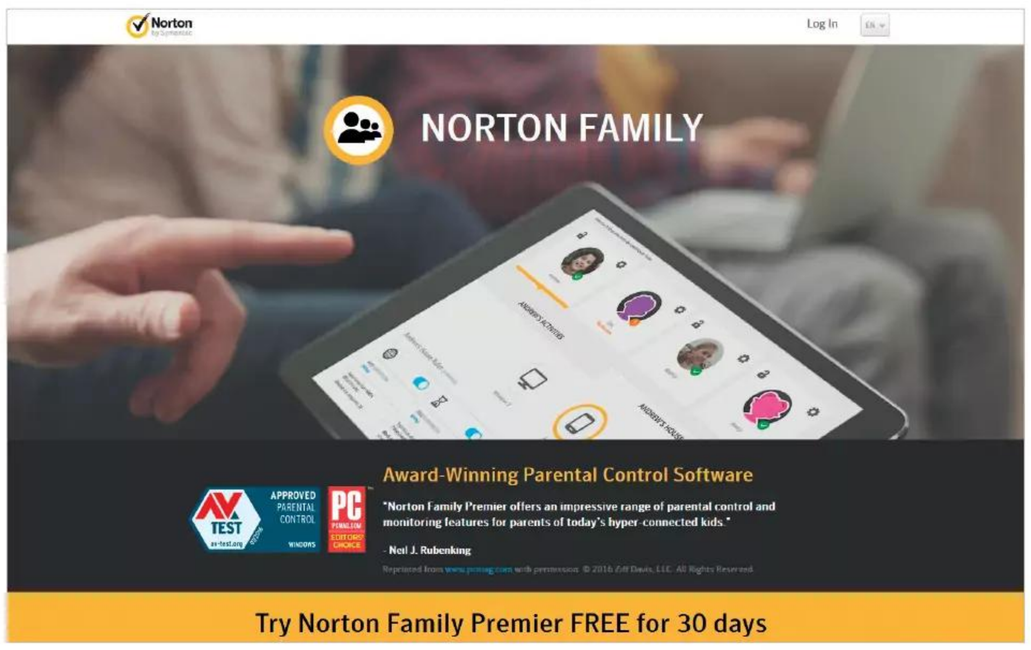
BITDEFENDER

Bitdefender's Total Security suite offers an excellent parental control and monitoring tool within it's already impressive list of features. It's cross-platform, can shield children and young people from inappropriate content and extends its use to mobile devices too. Pricing starts at just £34.99.



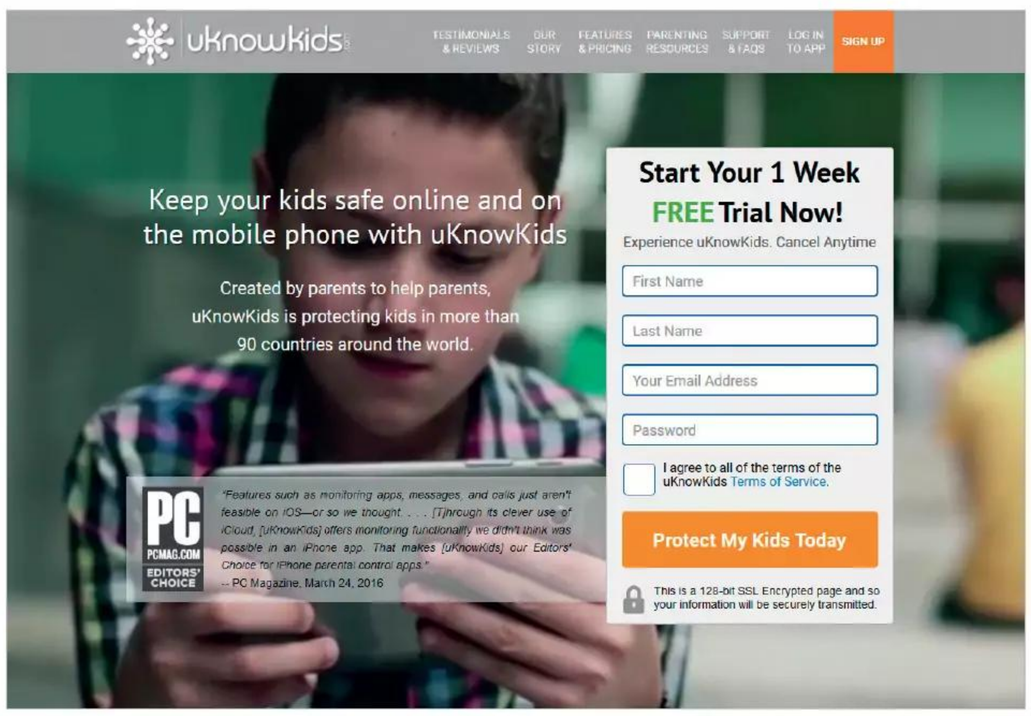
NORTON FAMILY

Norton Family is a previously mentioned tool that offers both free and paid for services to help protect children and young people online. It's cross-platform, provides protection for social media accounts, time supervision, activity monitoring and much more. Check the site for the latest features and pricing.



UKNOWKIDS

uKnowKids provides a wealth of features for parents, including call logging on devices (with Facetime call logs), image reviews that children post, social media monitoring and web browsing history access and controls to block inappropriate content. Pricing varies, so it's best to visit the uKnowKids site to see the latest offers available.

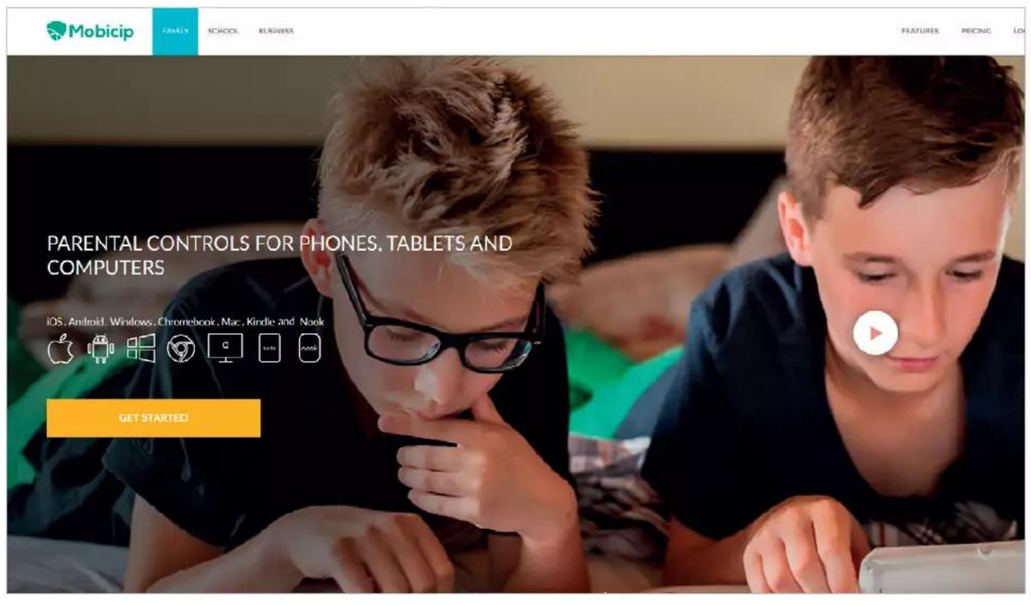


KASPERSKY

Kaspersky Total Security 2017/8, very much like Bitdefender, offers a parental control feature within its security suite. With it the parent or guardian can set time restrictions, block access to inappropriate content, monitor Internet activities and monitor communications on mobile devices. Prices start at just £31.99 per year for a single device.

MOBICIP

Mobicip is a cross-platform tool that offers app monitoring, web browsing monitoring, time limits and custom filters. The basic package is free but has some good features on offer, whilst the premium package costs $39.99 per year.



K9 WEB PROTECTION

K9 Web Protection (nothing to do with protecting dogs from accessing the Internet) is a free, cloud-based Internet filter that blocks inappropriate content, sets time restrictions, forces safe search on all search engines and works on both Windows and Mac computers.

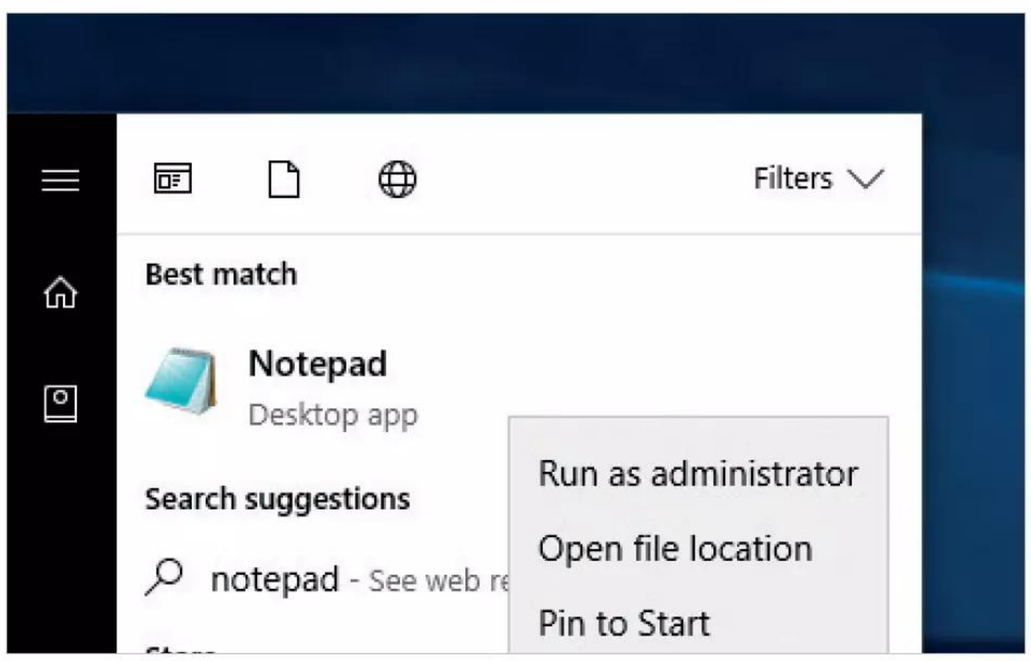
Using the Windows Hosts File to Block Sites

The Hosts file is used by the operating system to map hostnames to IP addresses. It's a historical file that's used by Windows to signpost internal and external websites, and other such networking services. You can use it to your advantage though.

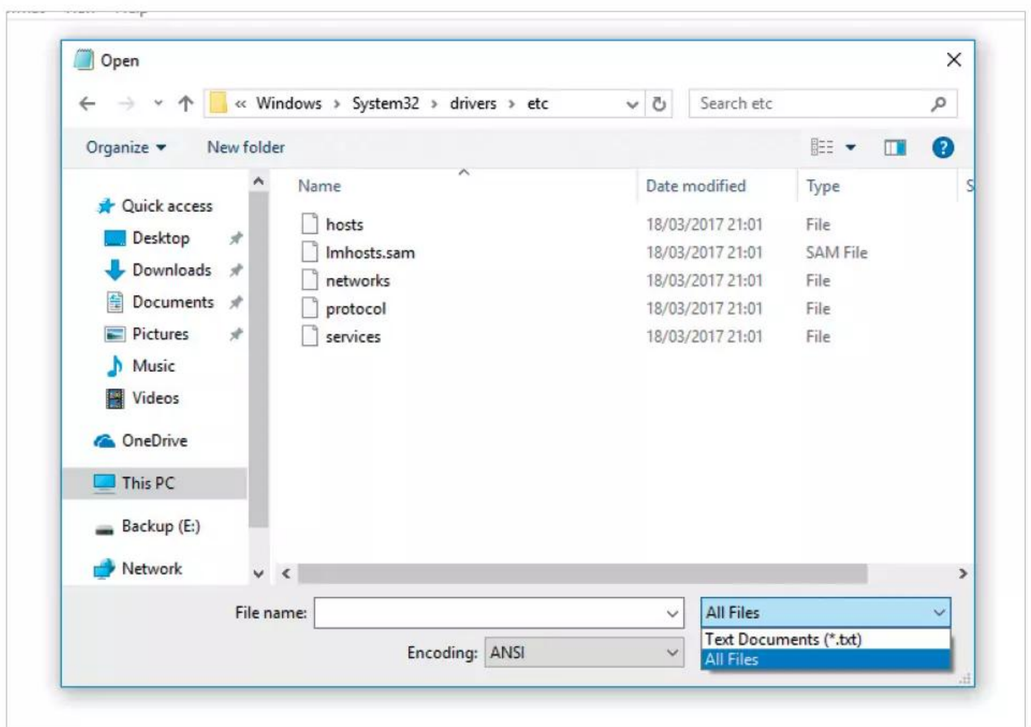
The Perfect Host

The Hosts file is simply a plain text file for mapping network locations and is checked by Windows to see if there's an entry whenever the user requests access to a website or network resource. Here's how to block websites using it.

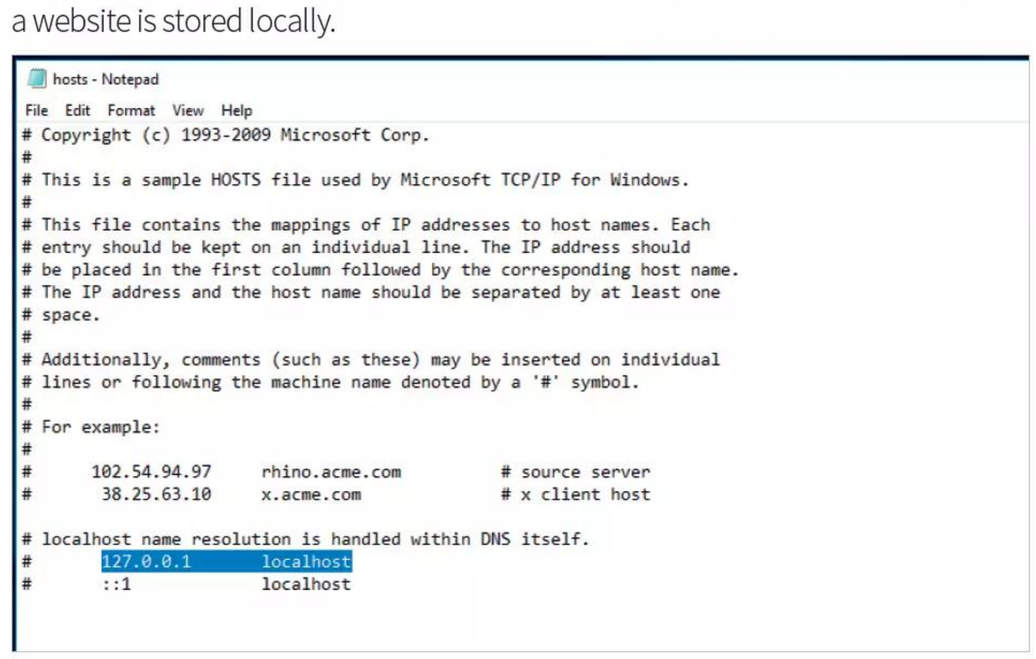
STEP 1 First you need to open the Hosts file with administrative access. To do this, click on the Windows Start button and type notepad. When Notepad appears in the search list, right-click it and choose Run as Administrator from the menu and click Yes for the UAC message authentication.



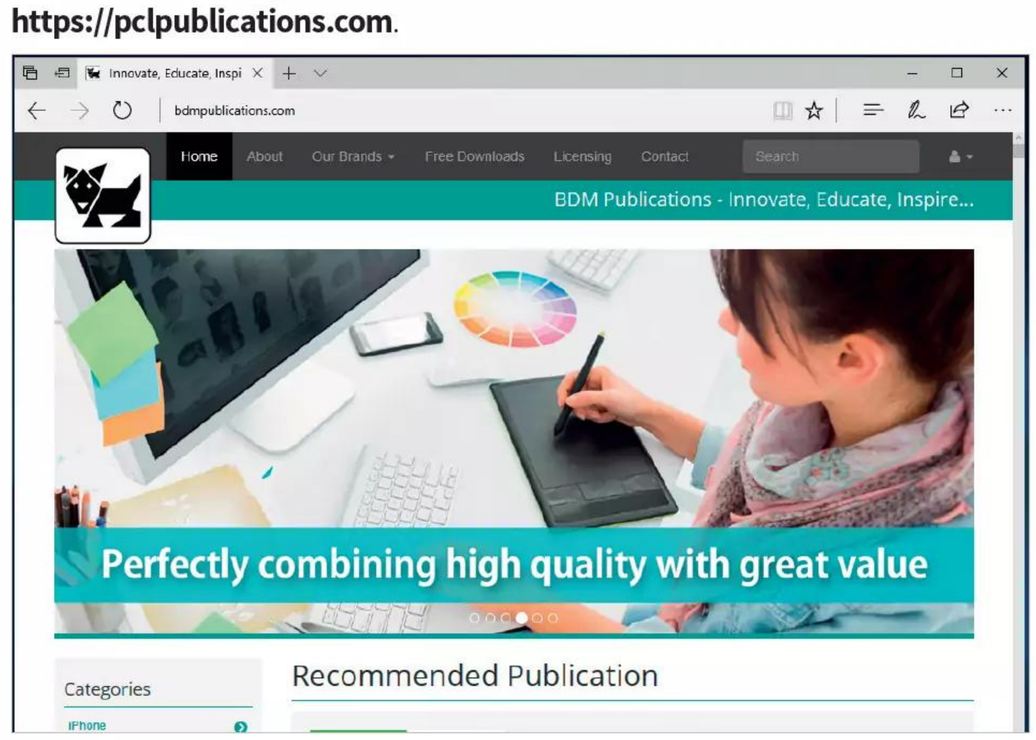
STEP 2 Within Notepad click File > Open and navigate to c:\Windows\System32\drivers\etc. Click the drop-down menu saying Text Documents and change it to All Files. This will list the files within the etc folder. Click on the Hosts file, then click the Open button.



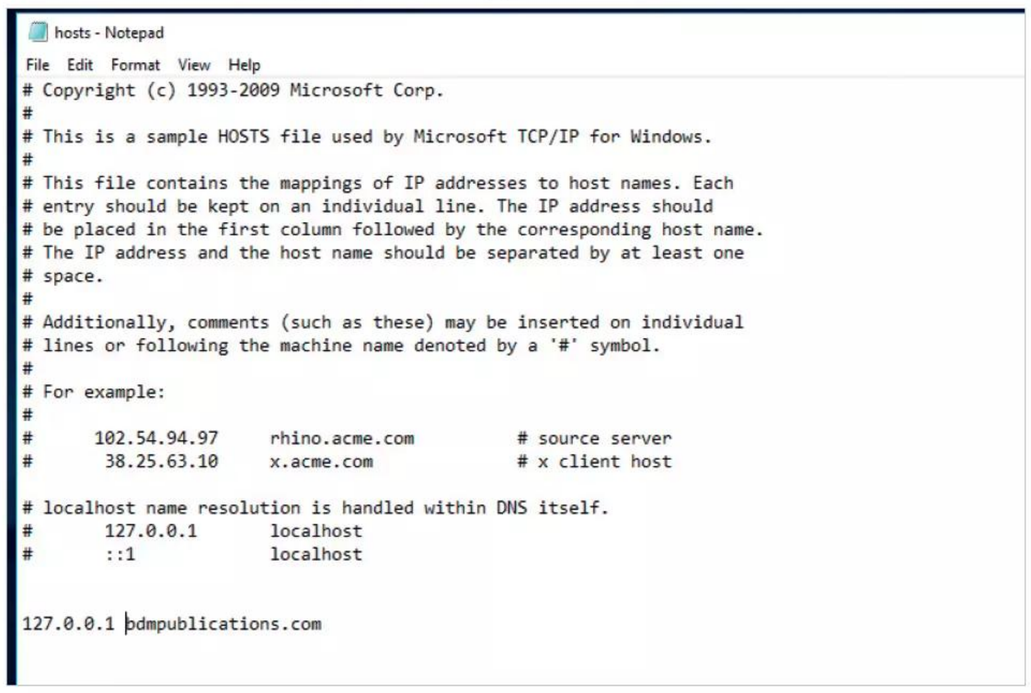
STEP 3 You can see that the Hosts file is a historic text file dating back from the early days of networking and communications. The localhost entry at the bottom of the file, 127.0.0.1 is your computer. This is the important entry, as we're going to fool the networking services into believing that a website is stored locally.



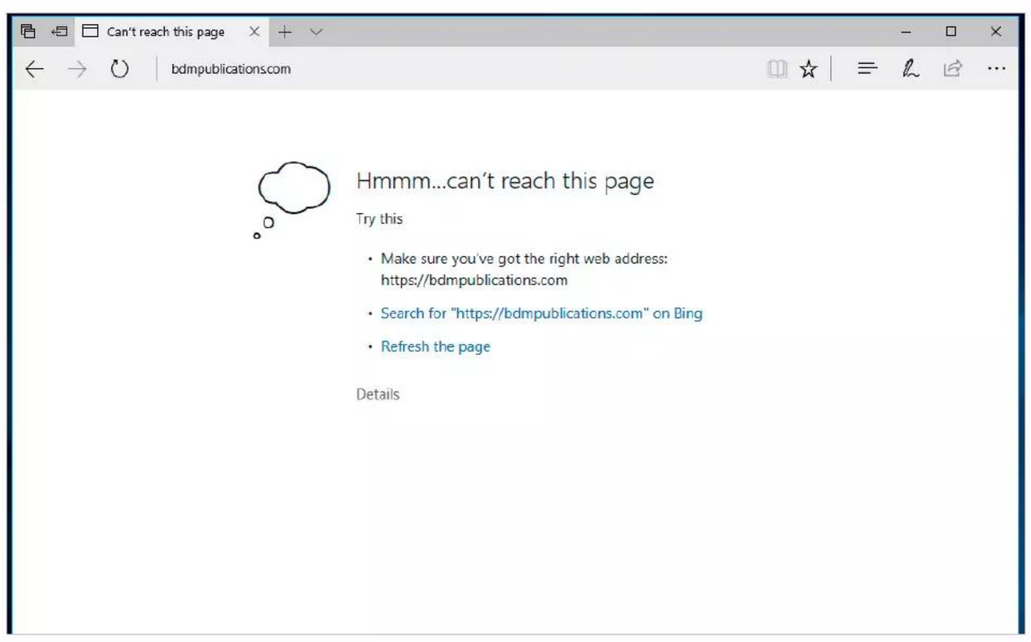
STEP 4 It's this fooling Windows that makes this such an effective solution to blocking sites, as you're not fiddling with your router or other networking devices. Let's say, for example, you want to block BDM Publications. Open a browser and go to the BDM Publications website, **https://pclpublications.com**.



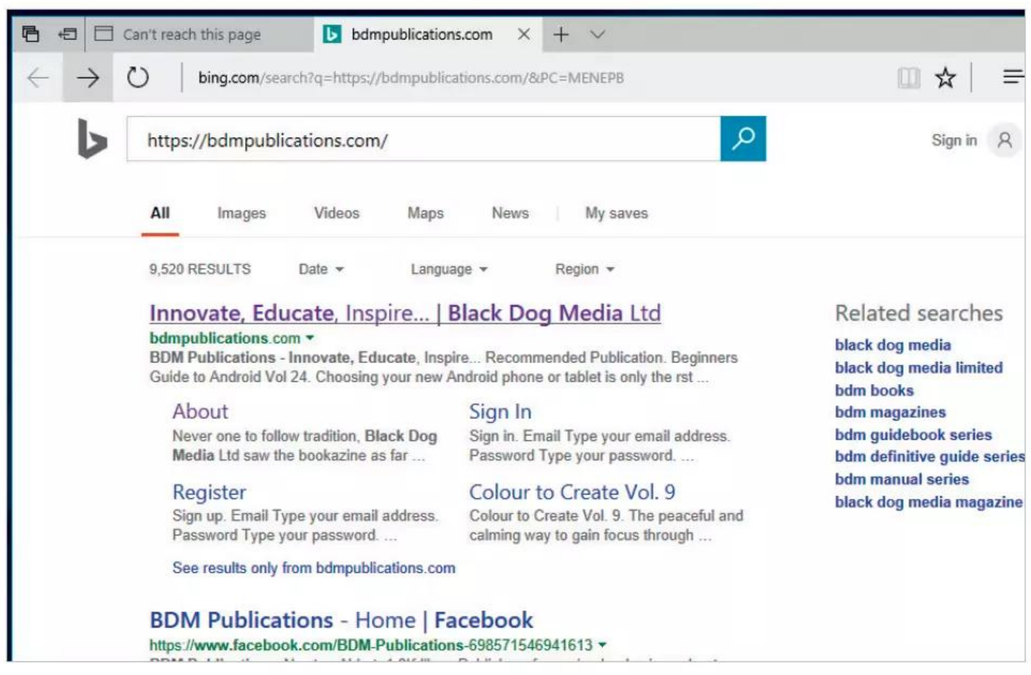
STEP 5 Either close or minimise the browser window and get back to the Hosts file in Notepad. Press Enter a couple of times to start a new line under the last hash and type in: **127.0.0.1 pclpublications.com**. Don't add the HTTPS or the www part, just as it appears in the address bar.



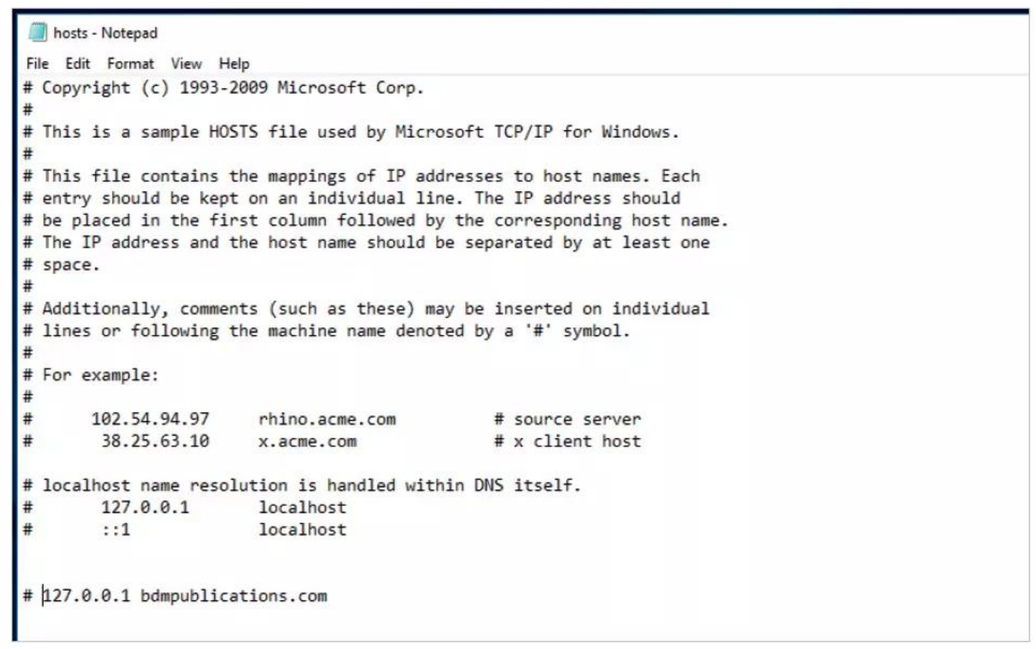
STEP 6 In Notepad, click File > Save, to obviously save the newly edited Hosts file. Now get back to your browser and either refresh the page or close and reload the browser. When back up, in the address bar enter the site: **https://pclpublications.com**. You can now see that the page won't load.



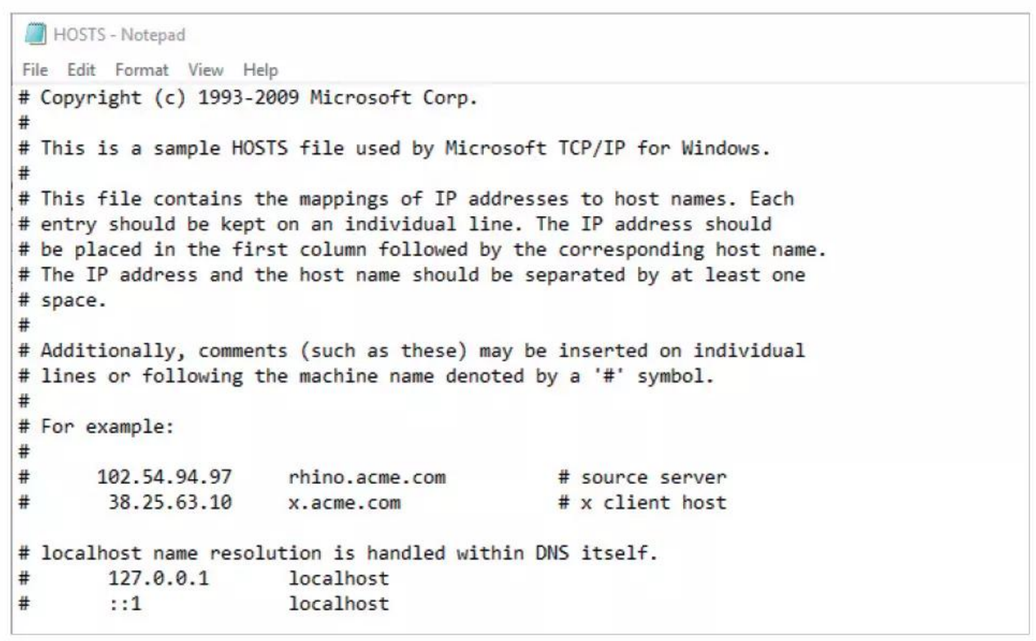
STEP 7 You can try searching for it via Google or Bing but it still won't load as you've successfully blocked access to the website's hostname from the Hosts file. You can also see that any sub-domains after the main pclpublications.com address are also blocked, which is certainly handy for some sites.



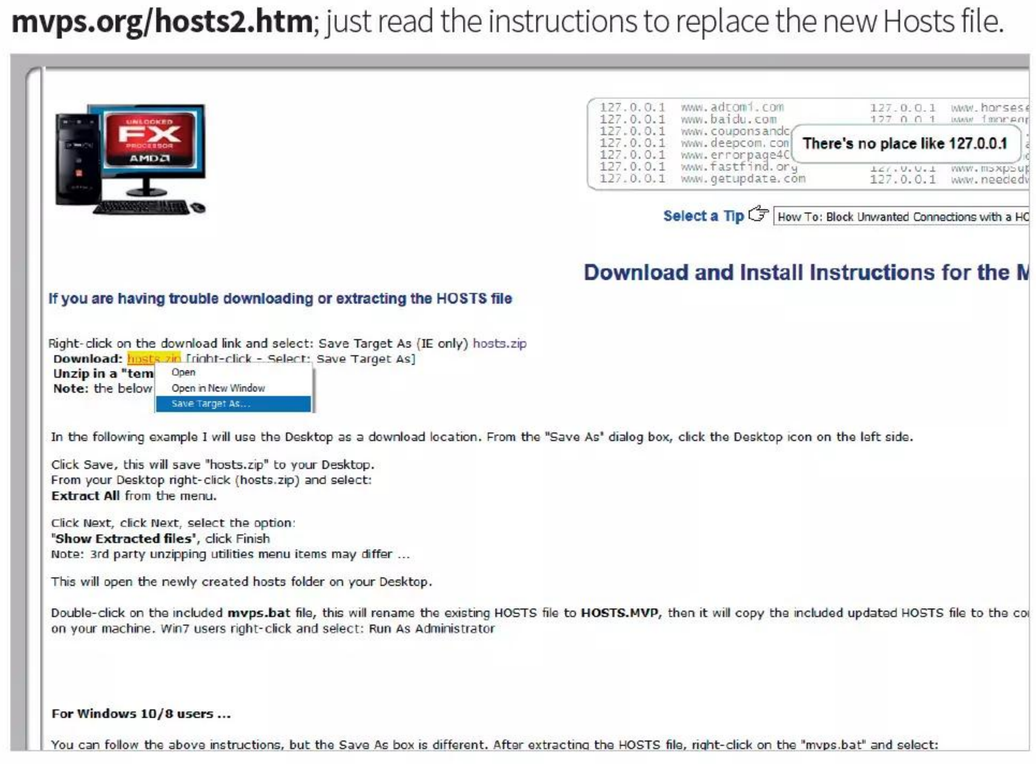
STEP 8 What we've done here is fool Windows' networking services into thinking that the website pclpublications.com, is being hosted on the computer itself and not out there on the Internet. If we wanted to remove the block, we can simply delete the line or put a hash at the start of the line and save the file.



STEP 9 Over time you can add more sites to the Hosts file list, pointing each one back to the 127.0.0.1 address of the local computer to block it from ever being reached; even if you use a different browser or other Internet accessible program.



STEP 10 If you want a complete list that's already been created, then WinHelp2002 provides a downloadable compressed Hosts file that you can replace your own with. You can find it at **http://winhelp2002.mvps.org/hosts2.htm**; just read the instructions to replace the new Hosts file.



Further Protection for Young Adults

Younger children are certainly vulnerable when on the Internet but from 13-years a teenager is allowed to have a Facebook, Twitter and other social media accounts. This opens up a whole new level of online protection issues and significant dangers within.

We look at how you can help protect their social media status and how to create their own Windows accounts.

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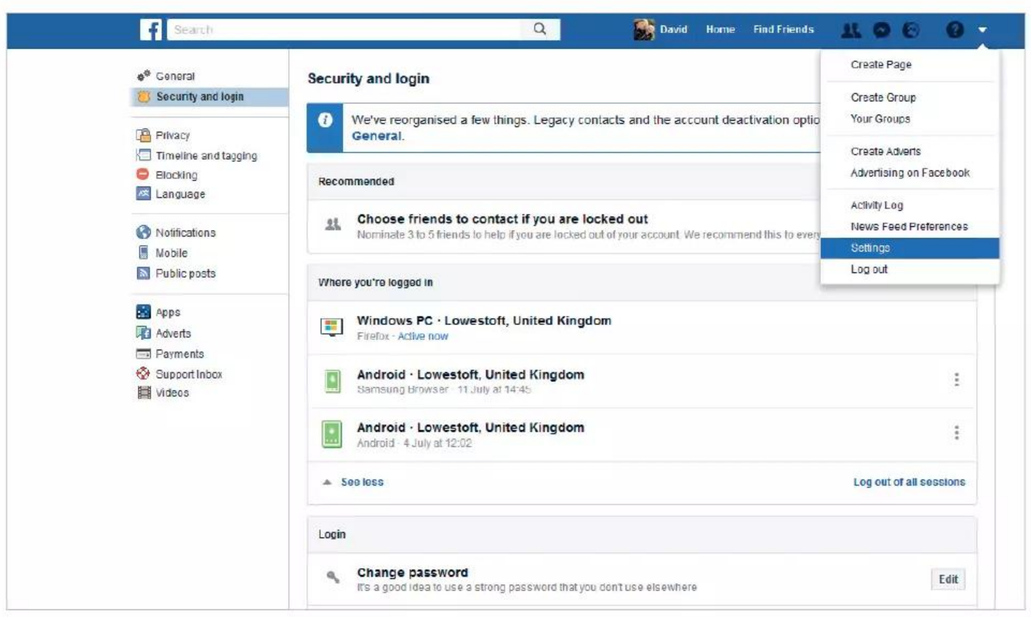
Staying Safe with Facebook for Teens

If your child is thirteen they're now, according to the rules of the company, allowed to have a Facebook account. Facebook's popularity has waned in recent years with teens but it's still heavily used. Therefore, we need to make sure that our teens are safe when on it.

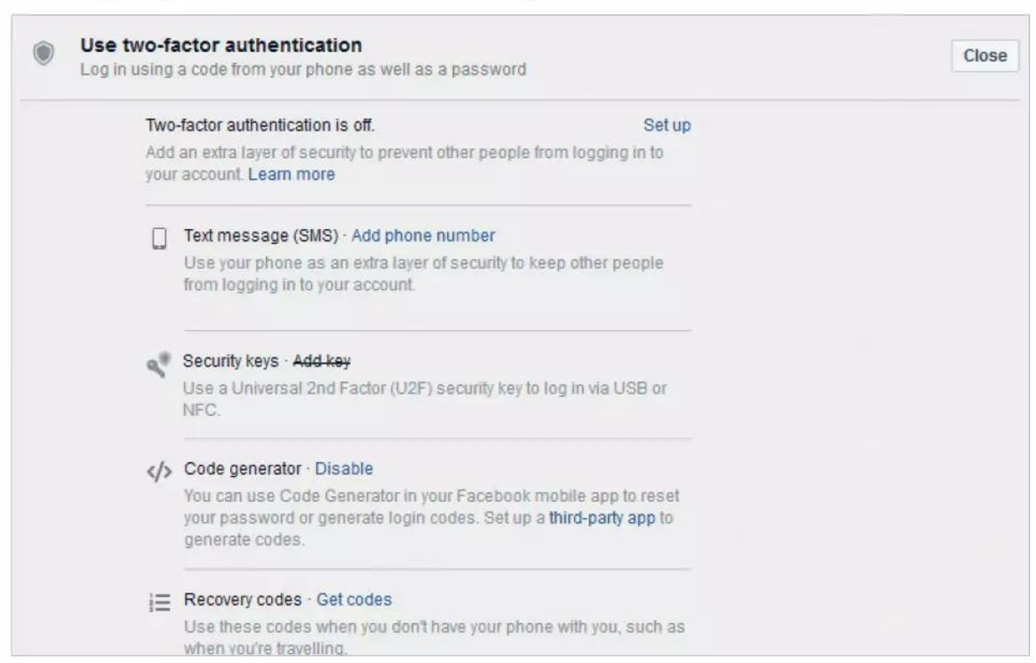
Smells Like Teen Facebook

Providing you adhere to the recommended security settings for Facebook, and don't add just anyone who sends you a friend request, you should be relatively safe. However, these ten tips will help.

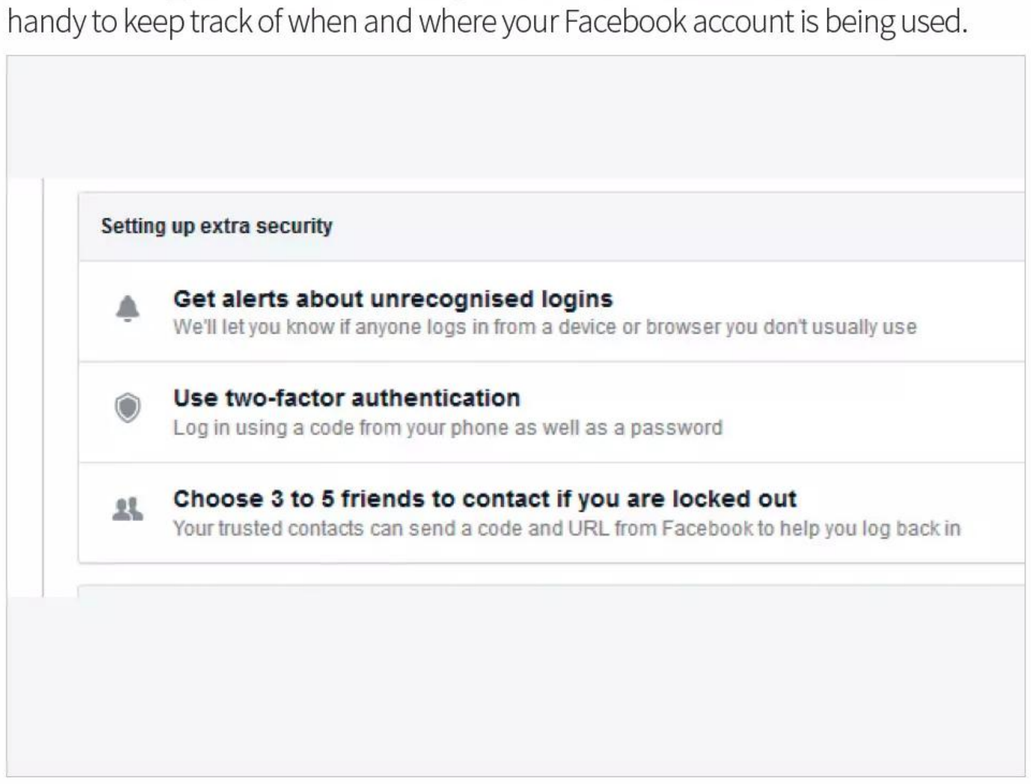
Get to the Facebook security settings by clicking on the Down Arrow next to the question mark in the top right of the Facebook interface. From there click the Settings option on the menu and then Security and login on the left-hand panel. If you haven't already, make sure you're using a strong password, as suggested earlier in this book.



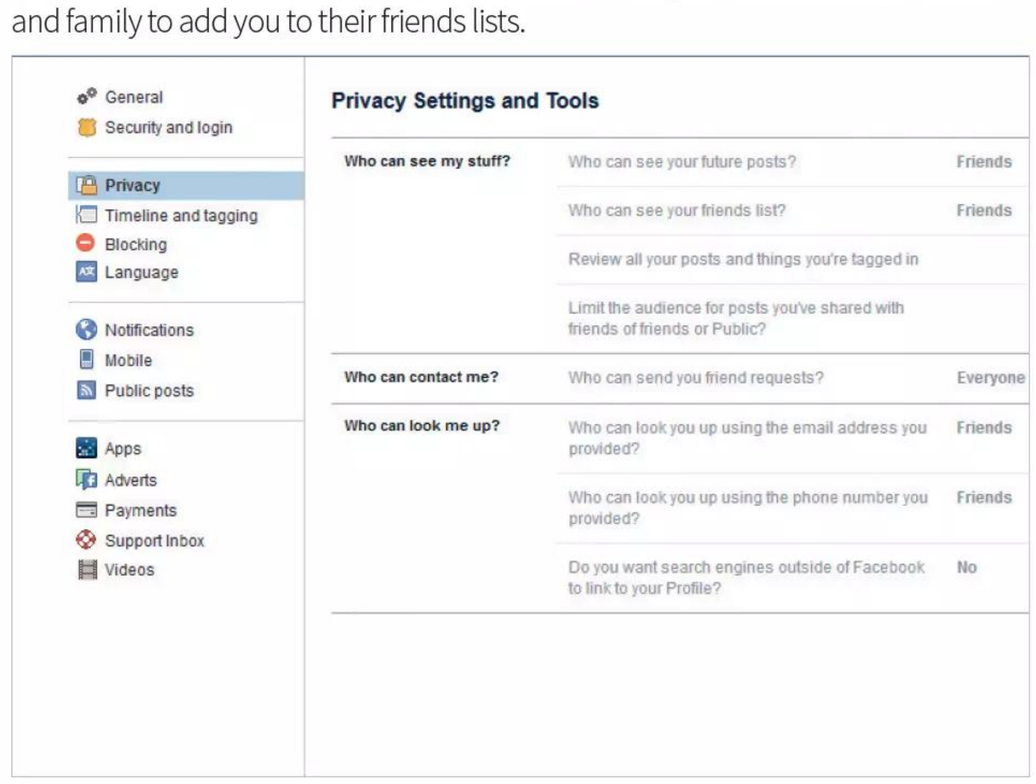
In the same section, you're also able to set up two-factor authentication, utilising your phone, where Facebook will send a code to login with along with using your password. This elevated level of security ensures a higher degree of safety, as your account will be extremely difficult to hack.



Whilst in the Security and login page, click the 'Get alerts about unrecognised logins' section's Edit box, this enables you to view if your account is logged in from an unrecognised device. This particular function is handy to keep track of when and where your Facebook account is being used.



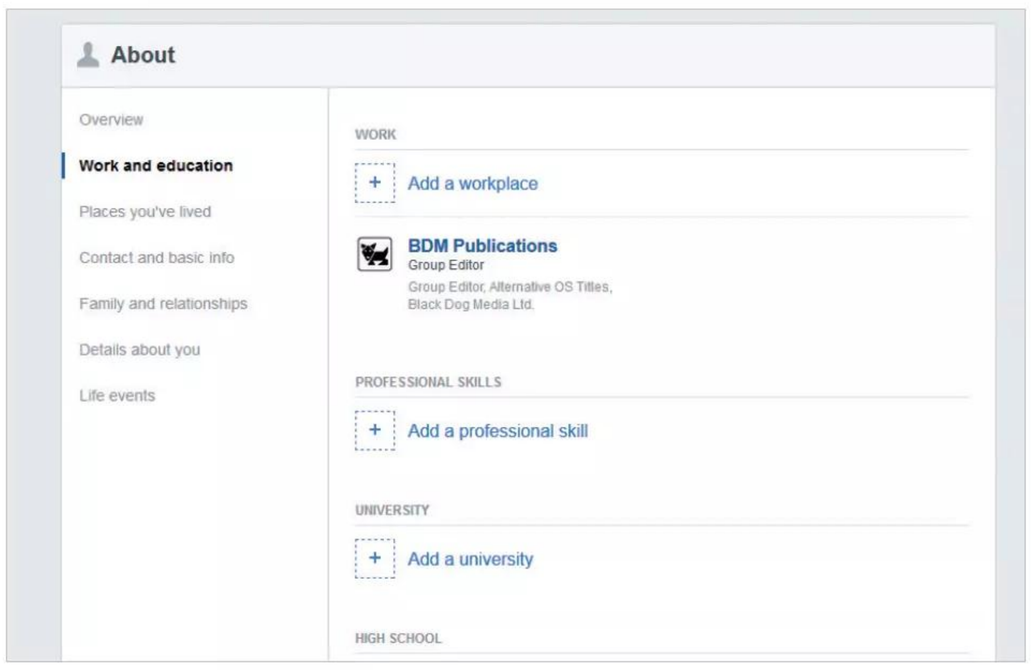
Click on the next section heading on the left-hand pane, Privacy. Take a moment to run through each of the options in this page, to ensure that your account is as private as possible, whilst still being available for true friends and family to add you to their friends lists.



We're sure you don't need telling this, but never type your password into your Timeline. It may sound like a very basic tip but there have been instances of users being fooled, or simply not thinking of what they're doing or where they're typing, into entering their password into the Facebook Timeline.

Never accept a friend request from a random stranger. Sometimes they accompany their request with a message, something along the lines of 'hey, remember me? We met in town. . .', or something similar. The hope is that you'll accept the request blindly and once in your friend list, they can get all manner of details from you.

Although it's nice to put forward information about yourself in your Facebook account, be a little cautious and consider not entering too many details. It's very easy for someone to then retrieve information regarding your date of birth, where you live, where you went to school, where you work and so on.



Try to avoid being drawn into mass phishing posts, where the response asking is along the lines of 'List five things about yourself, then pass it on', or even posts that ask for likes. These are generated to catch active user accounts, which can then be used for phishing attempts.

Don't be fooled into thinking that posts asking for people to help locate a missing child, pet or object are real. Not only are most of these phishing attempts but often they can be attempts of someone trying to find a person; there could be a reason that the person in question has left, an abusive relationship perhaps.

Always think before you enter a post or reply to one. Just as you would in life, sometimes it's best not to say anything at all rather than offend or anger someone who's is blatantly baiting others. Think also about what images you post. Could your address or other details be discovered from the image?

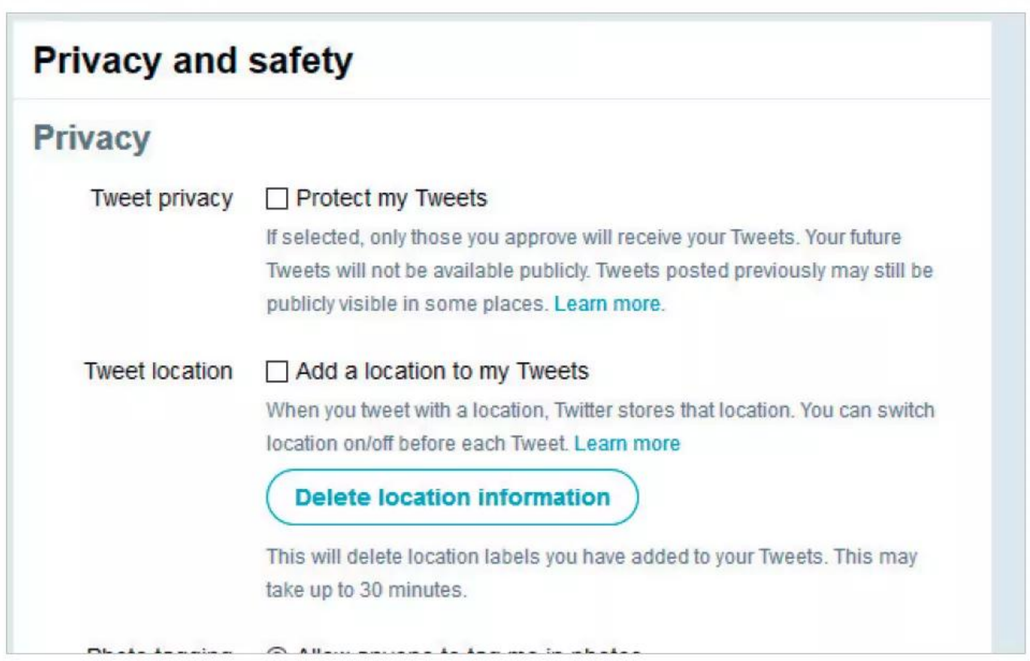
Staying Safe with X FKA Twitter for Teens

X has been seen as both a force for good, allowing users from other parts of the world to communicate with what's going on in their country and as a platform for the nastier side of humanity. For teens, there's a lot to consider with staying safe on X.

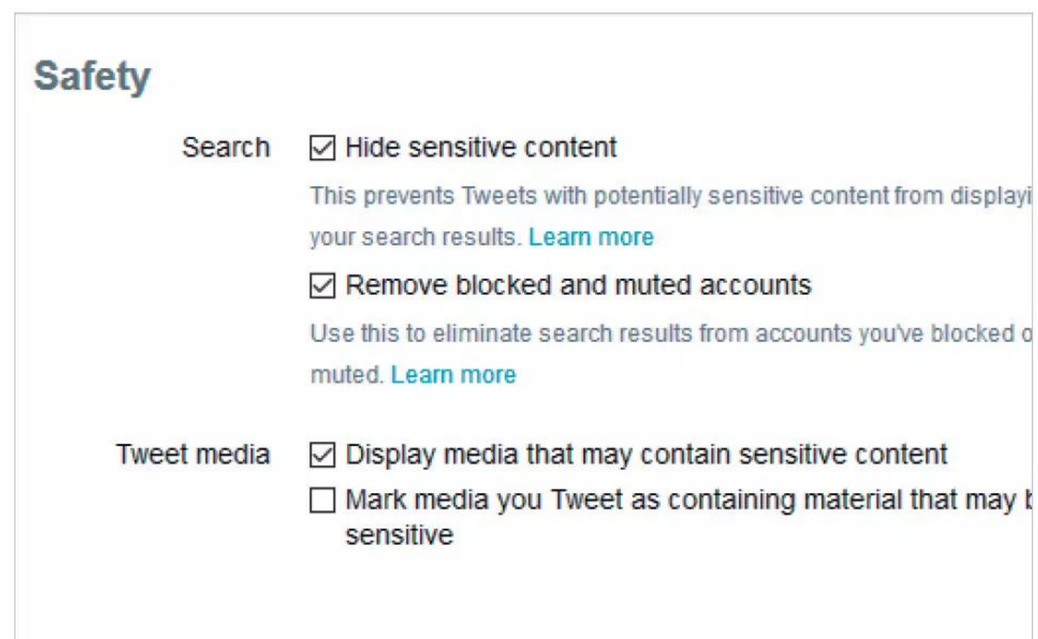
X Twits

The age for setting up a X account is thirteen but even adults can find themselves in a pickle from an errant Tweet or a X-based phishing scam. Here are ten tips to help keep you safe on X.

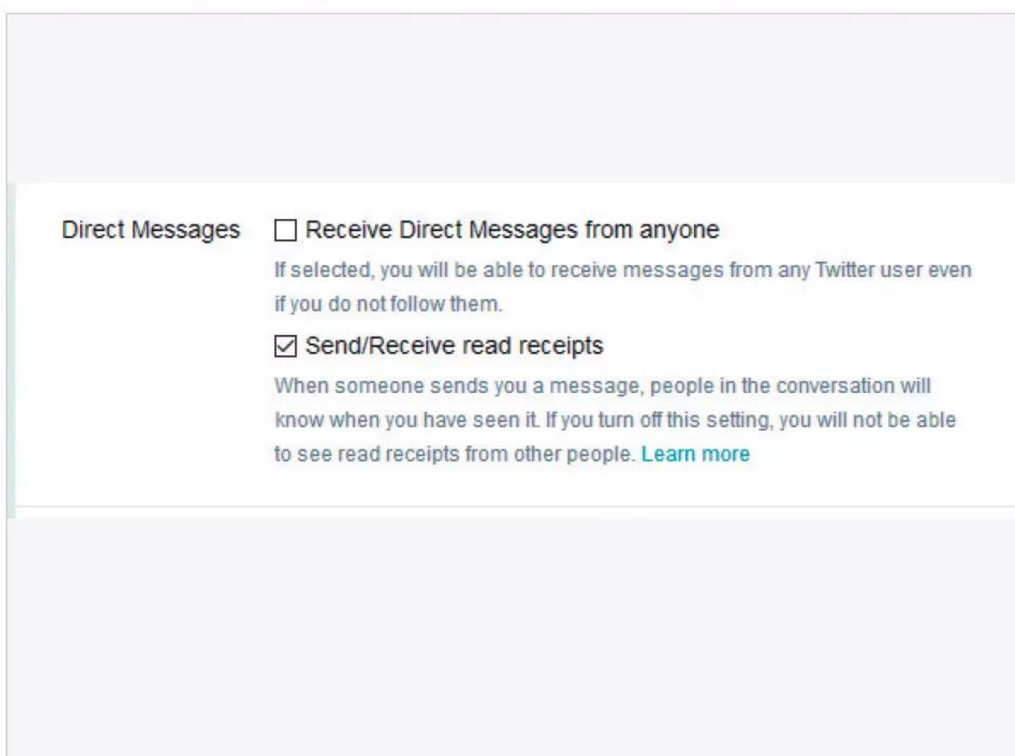
In X, click on your profile picture and choose Settings and Privacy from the menu. To the left-side of the Twitter interface, click on the Privacy and safety link. Consider enabling Tweet Privacy and disabling Discoverability for improved safety.



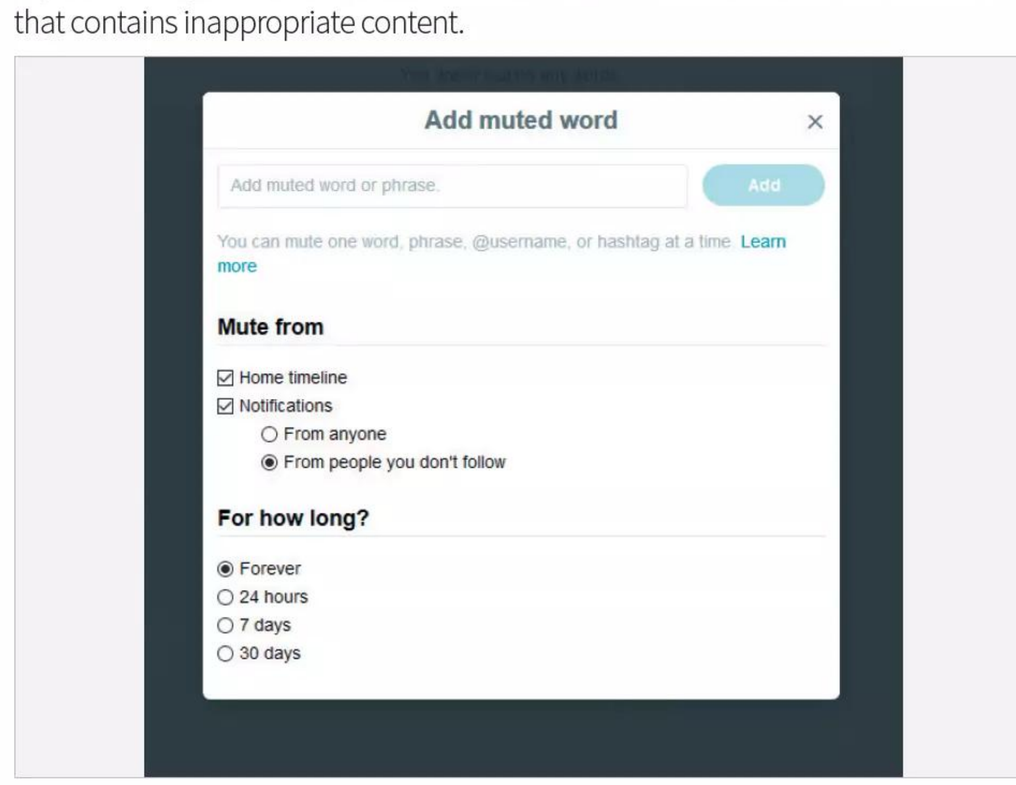
Just under the Direct Messages options, look to the Safety section. Here you can opt whether to hide Tweets that may contain sensitive content, remove blocked or muted accounts or display media that may also contain sensitive content.



Further down the Privacy and safety section, make sure that the Direct Messages option, Receive Direct Messages From Anyone is unticked. This way you won't get messages from anyone on Twitter, just those who you follow.

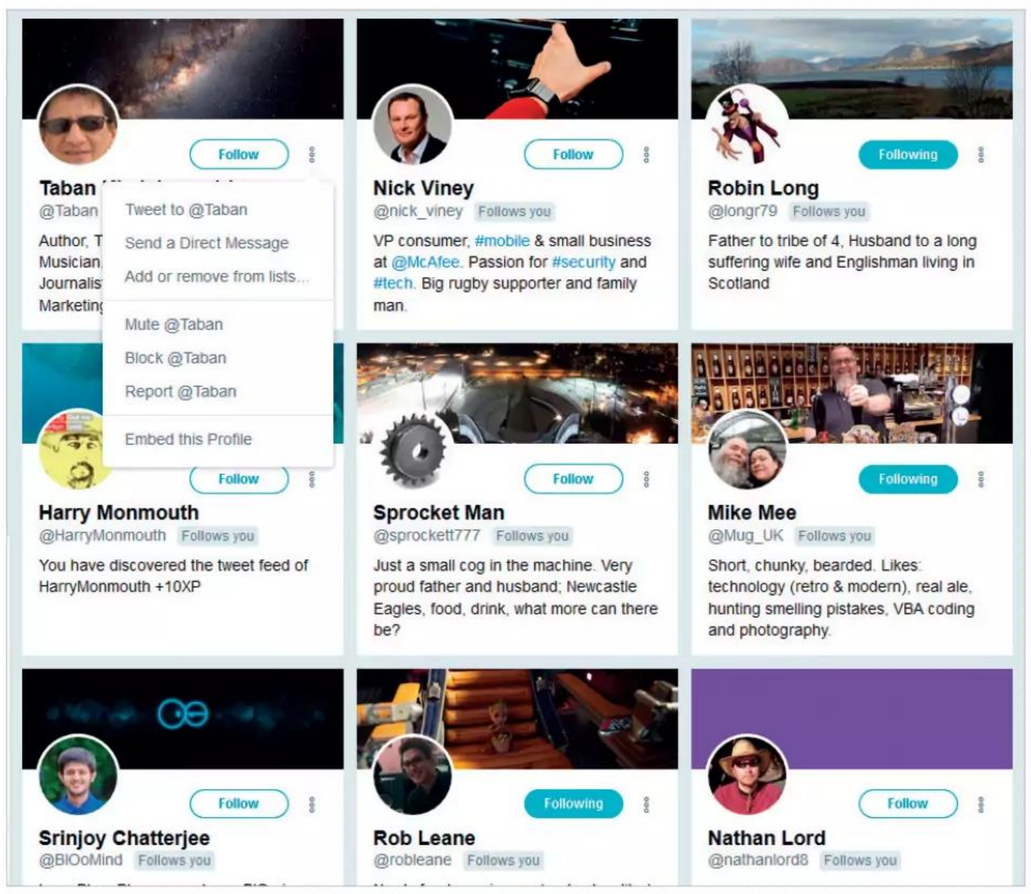


To the left-hand options pane, click on the Muted Words section. With this option you're able to hide certain words, phrases, usernames or hash tags. This is a great option to mass block any content you never want to see, or that contains inappropriate content.



If you see a Tweet from a user you don't like the look of, or is offensive in some way or form, you have several options available to you. Click the down-arrow next to the user's name and you can Mute, Block, Report or simply opt for I Don't Like This Tweet.

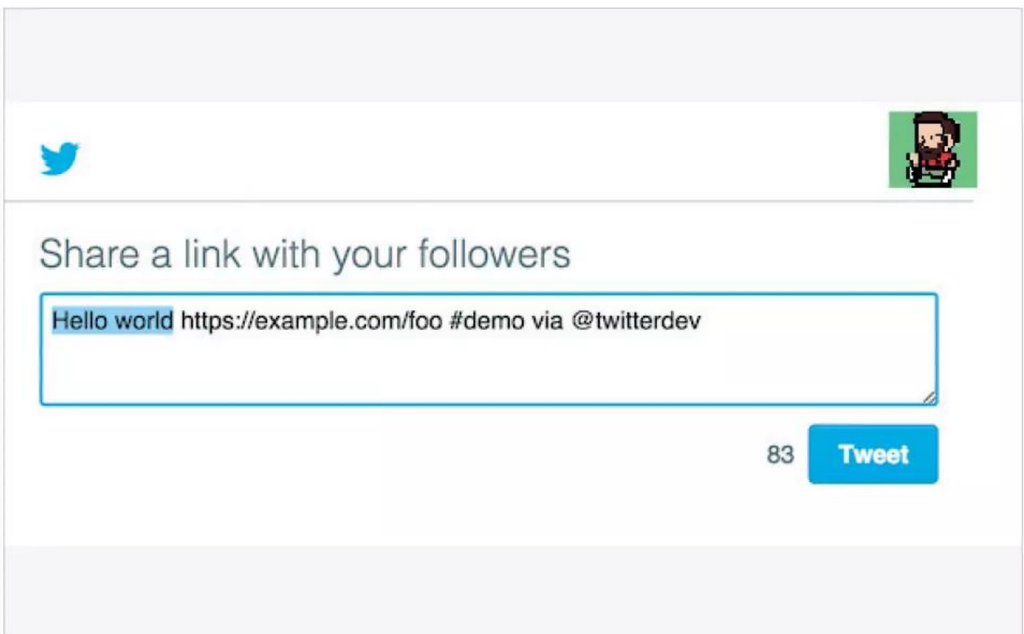
As a X user who hasn't enabled privacy, you're open to anyone finding and following you. You get an update as soon as someone does follow you and you then have the option to Mute, Block, Report or remove the user. Don't be afraid to remove a user if you don't know or trust them.



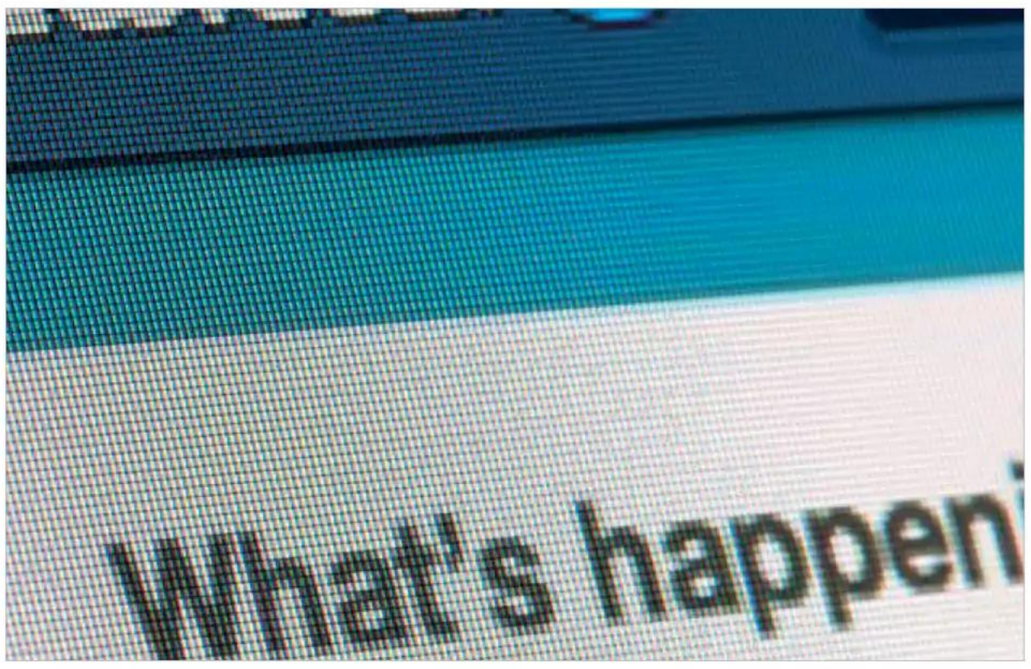
Just as with Facebook posts, don't be fooled into commenting on posts that are phishing attempts. These are created to farm for active accounts and gather information about users' tweets, and any personal details.

Try not to reply to any Direct Messages sent to you on Twitter. Whilst some messages and accounts are real, perhaps a job offer for example, many are simply Twitter bots phishing for active accounts and details.

Never click on any links that appear in a Tweet or as part of a Direct Message. Unless you specifically know the user and can trust their Tweets or messages; the link may lead you to a site that's riddled with malware or further scams.



Always think before you reply to any Tweets, post your own or upload any images. It's very easy to offend and become involved in a heated war over something you don't want to be a part of. Don't become the victim of anyone baiting you into an argument. If you are, then sign off and leave the group.



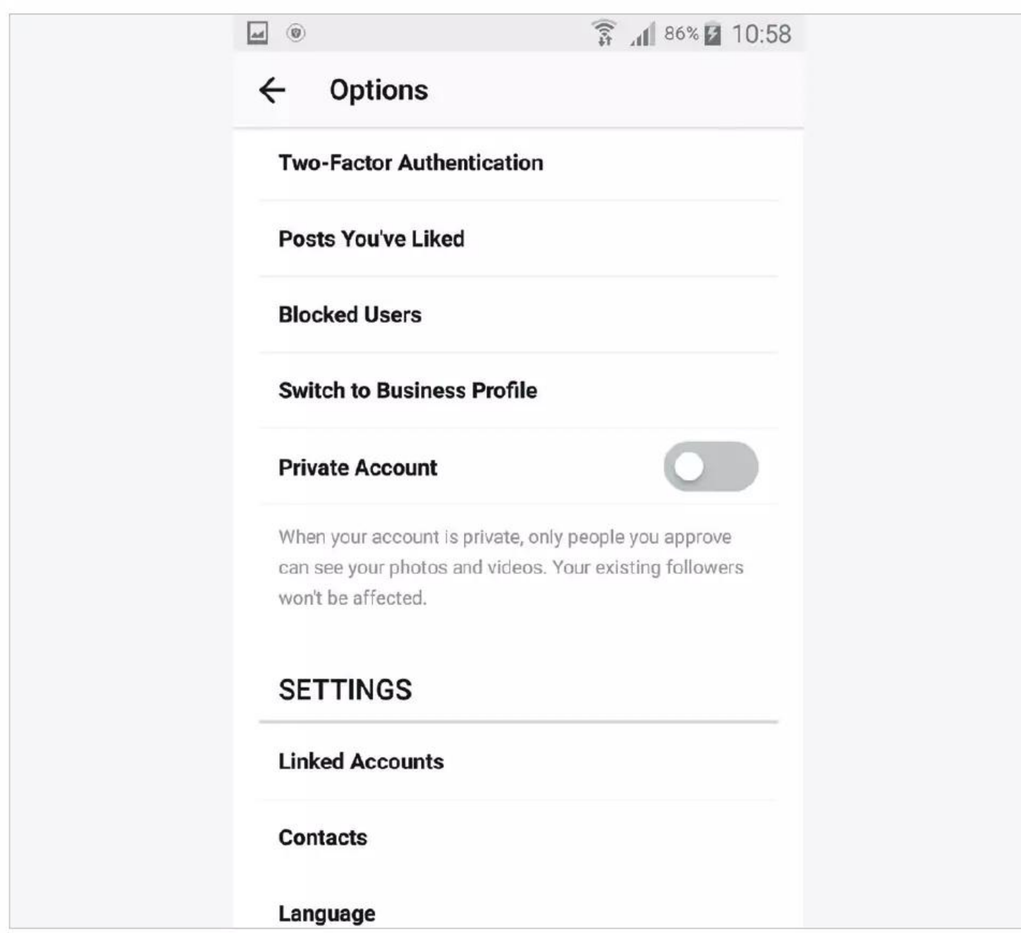
Staying Safe with Instagram for Teens

Much of today's Internet youth has moved from Facebook and now inhabits Instagram. This social media platform is used by celebrities, politicians and a user base of over 700 million. Needless to say, it's population is varied and contains those who you wouldn't want contacting you.

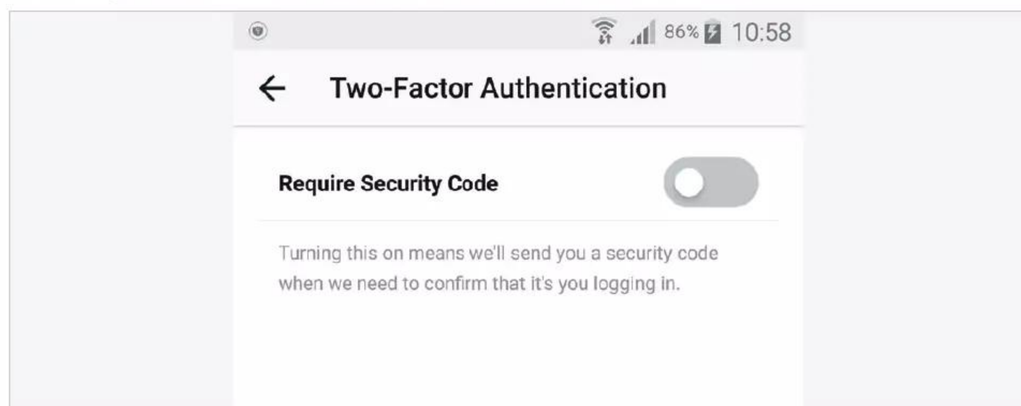
Insta-scam

In compliance with the Children's Online Privacy Protection Act, Instagram requires that its users' minimum age to sign up is 13 but even as a young teen, there's still plenty to do to help improve your safety.

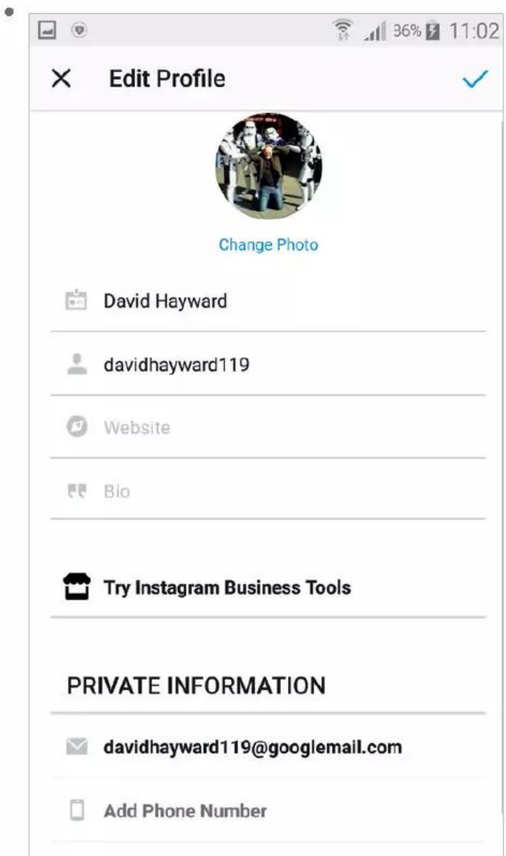
Instagram is a simple photo and sharing app but there's plenty of material and content out there that shouldn't be viewed by minors. That being the case, tap the person (profile) icon in the bottom right, then the three vertical dots in the top right. This opens the Instagram Options window. From there, scroll down and enable Private Account.



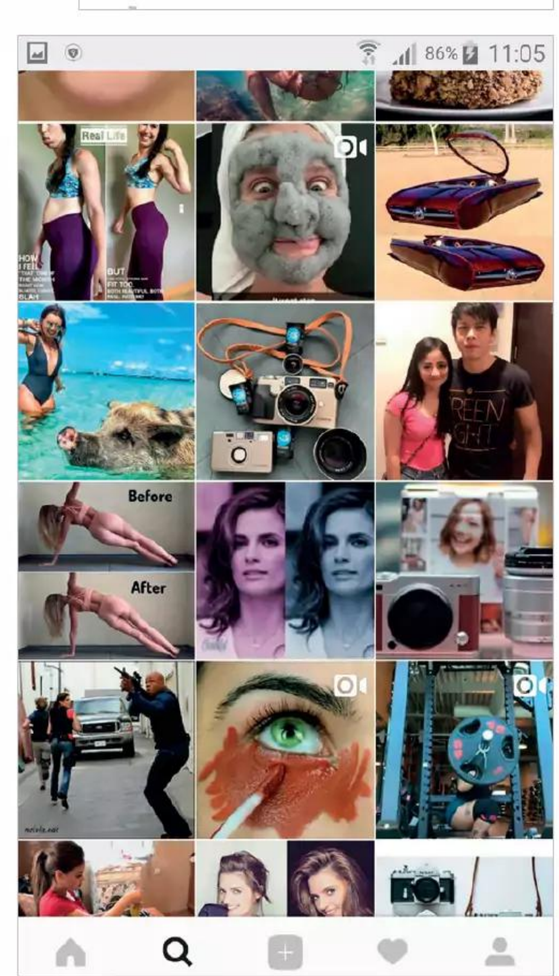
Private Accounts are visible, but not the content you've posted. Anyone who wants to follow you will need to send a request, so you can easily decline any users. Whilst still in the Account section, scroll up and consider enabling Two-Factor Authentication, for additional security.



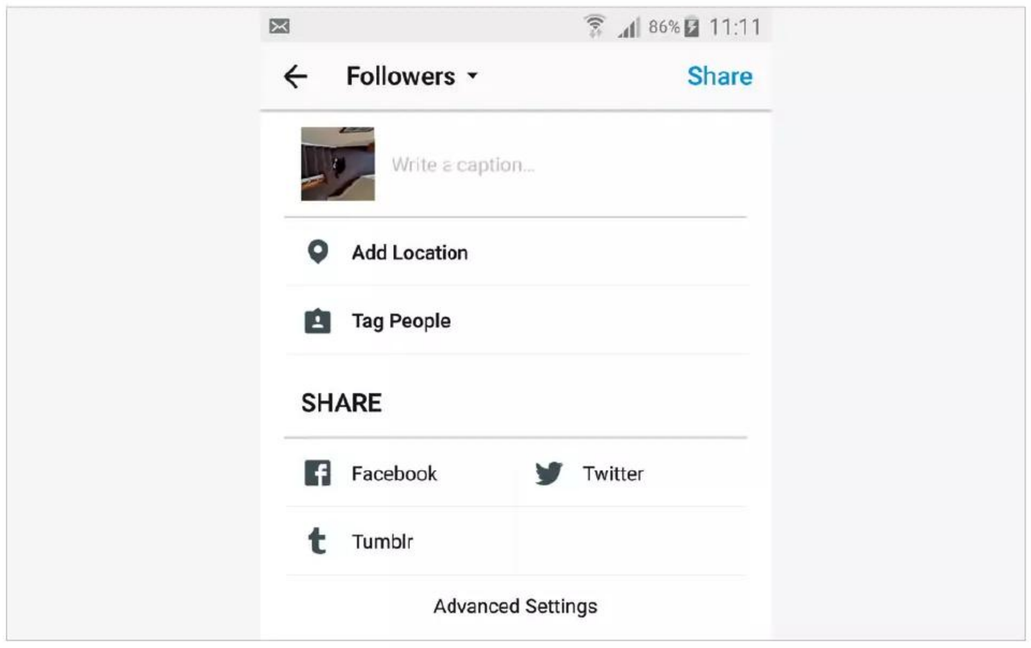
Staying in the Account section, tap on Edit Profile. This is where you can create a profile picture and include other information about yourself. It's up to you how much info you want to add but it's often best to take a secure-minded approach and not give away too much.



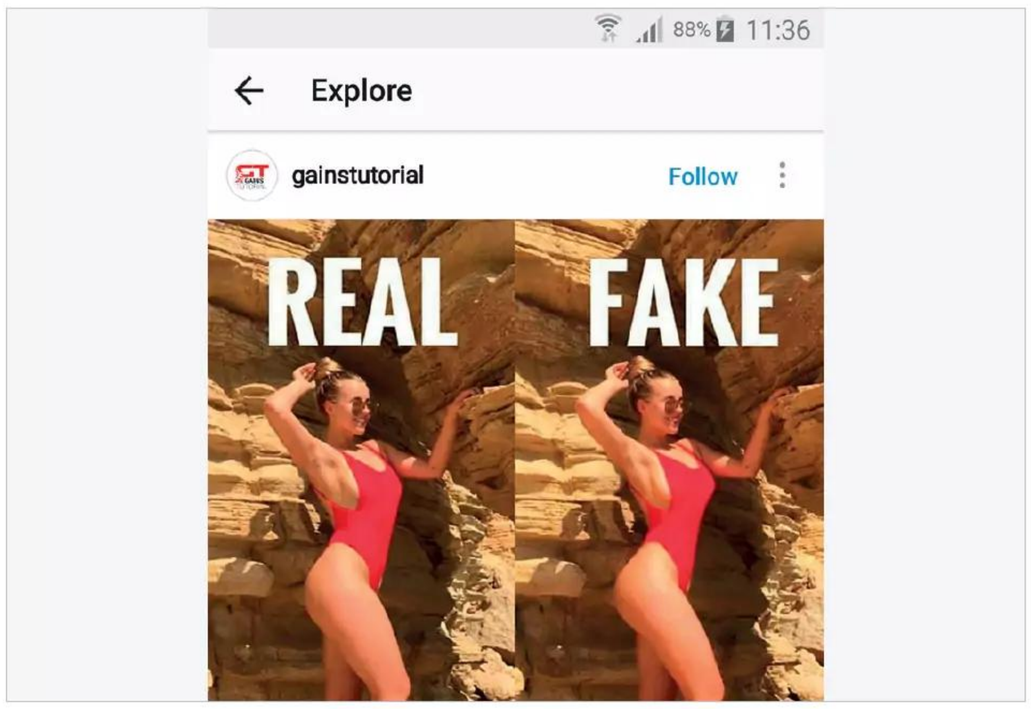
The magnifying glass icon is the Instagram search function. It often displays images and videos based on your likes and who you follow, such as amazing landscapes but it's also known to insert content that isn't always appropriate for younger viewers. Don't open the image, even to report it, it's best to just ignore it.



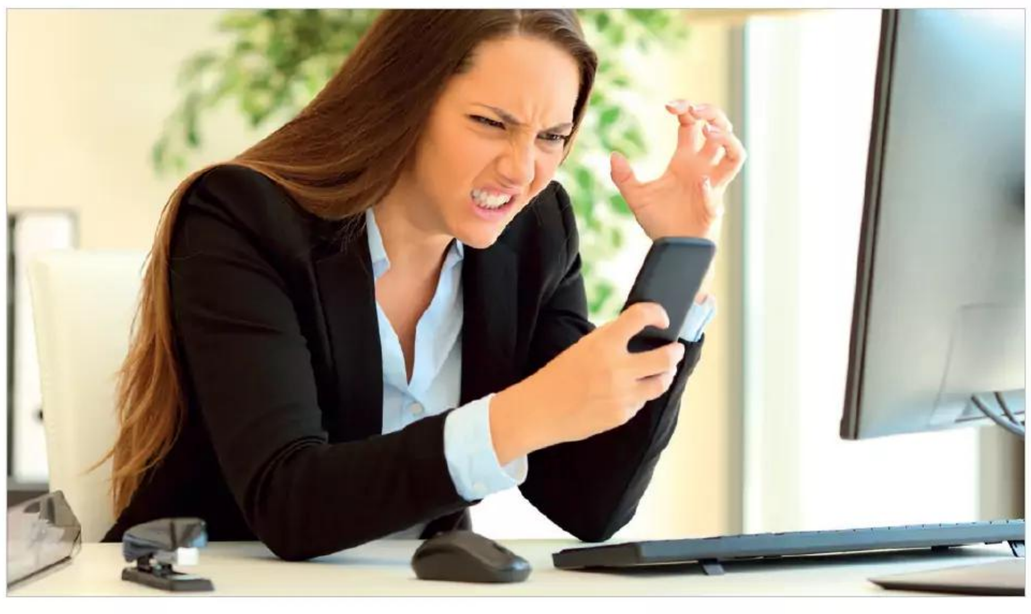
Uploading an image provides multiple options, from choosing a filter, image style and so on, to tagging other people, sharing with other social media platforms and adding a location. It may seem harmless enough but consider not sharing your location, as it's instantly available on Instagram. It doesn't take a genius to locate where you are.



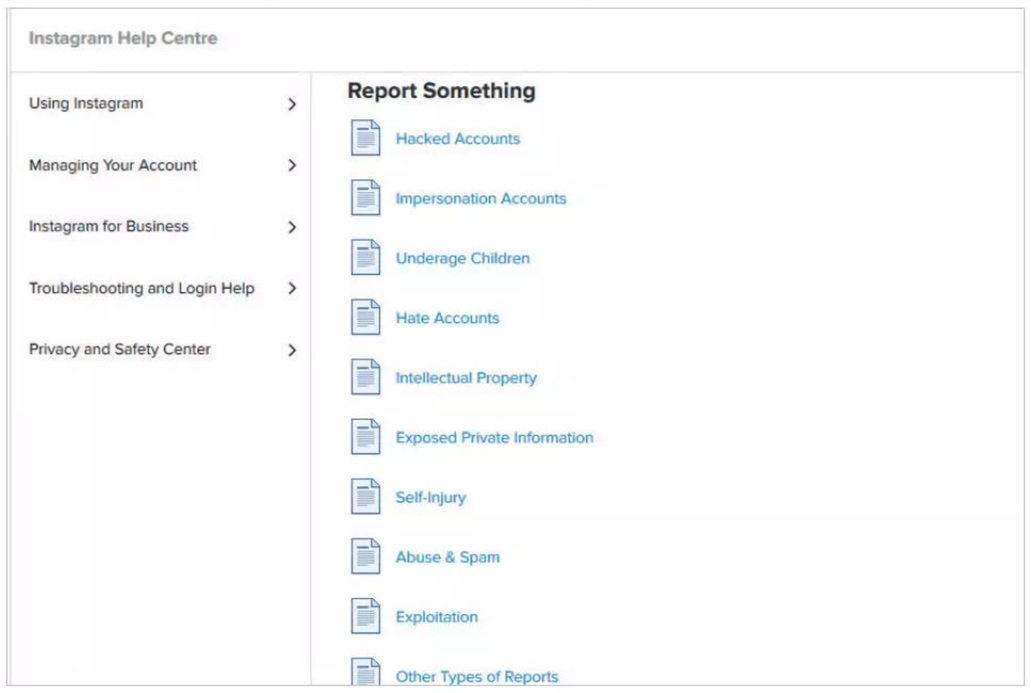
Be wary of what you see on Instagram. This applies to other social media platforms too but Instagram users appear to revel in posting fake or photoshopped images of themselves or others, or even events. It's a huge source of image-aware and body-conscious behaviour, that's influential to younger minds. In short, don't always believe what you see on Instagram.



If you've approved a user, whilst in privacy mode, and they start to send you inappropriate images, video or comments, then make sure that you show a parent or guardian. Don't respond to the sender and don't unfollow or block them until you've shown someone or taken a screenshot of the content.

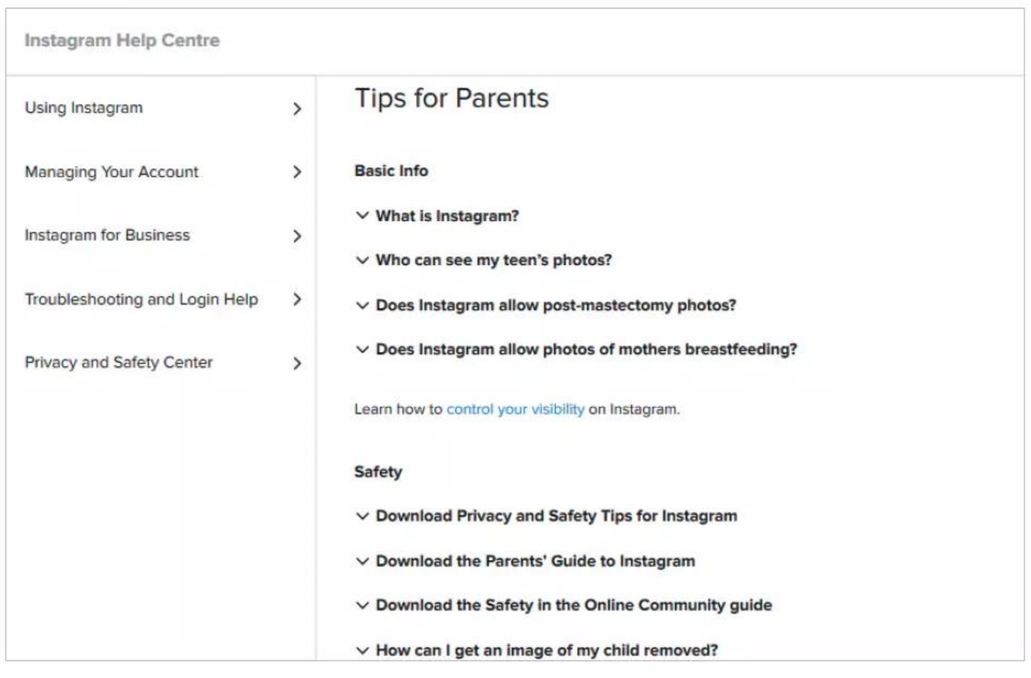


The Instagram Help Centre is where you can report a user for inappropriate content, abuse, spam, hacked accounts or exposure of private information. It's available from any browser, as well as from the app itself. Be familiar with it, as you may need it someday.



If you find yourself involved with someone or a group of people who are obviously trying to create some form of hate messaging, bullying or similar, make sure you take any screenshots as proof (in case someone reports the incident) and walk away from the conversation. Block accounts if necessary, to stop further instances happening.

Parents: before you allow your young teen access to Instagram, it's best you have a read through the company's Tips for Parents section. This can be found at **https://help.instagram**.com/154475974694511/?helpref=hc_fnav and includes everything you need to know about what it is and how it works.



Staying Safe with WhatsApp for Teens

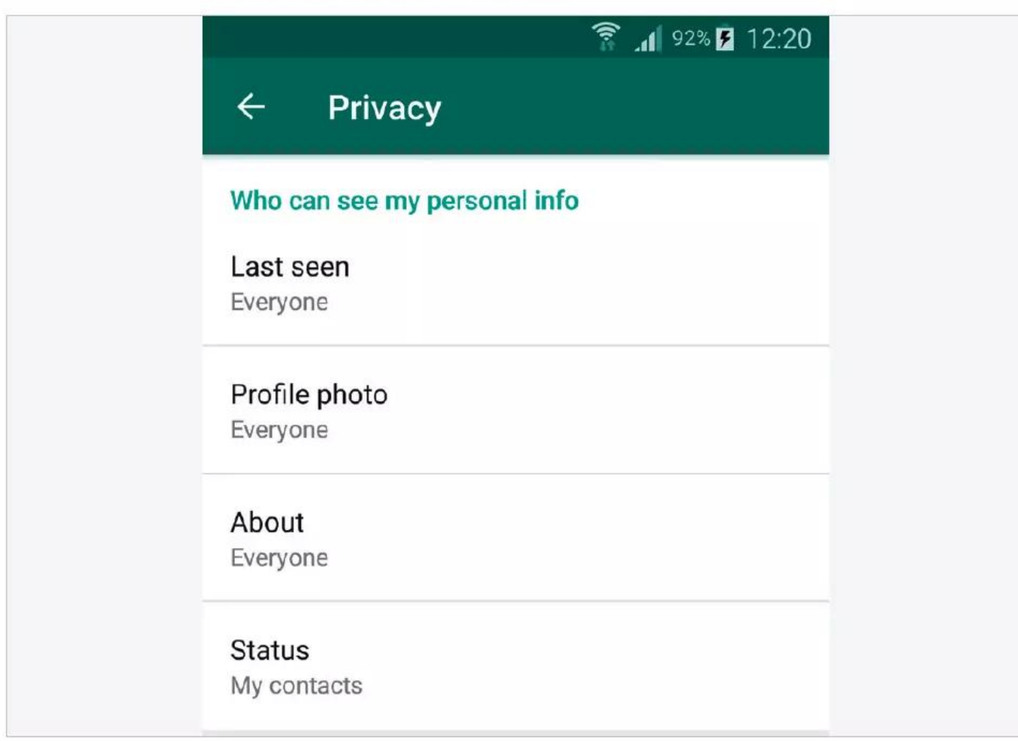
WhatsApp is a free messenger app that can make Internet voice and video calls, send messages, images and other content. It's a little safer than some social media platforms, as you need a user's phone number before being able to add them; but there's always room for further security.

What App?

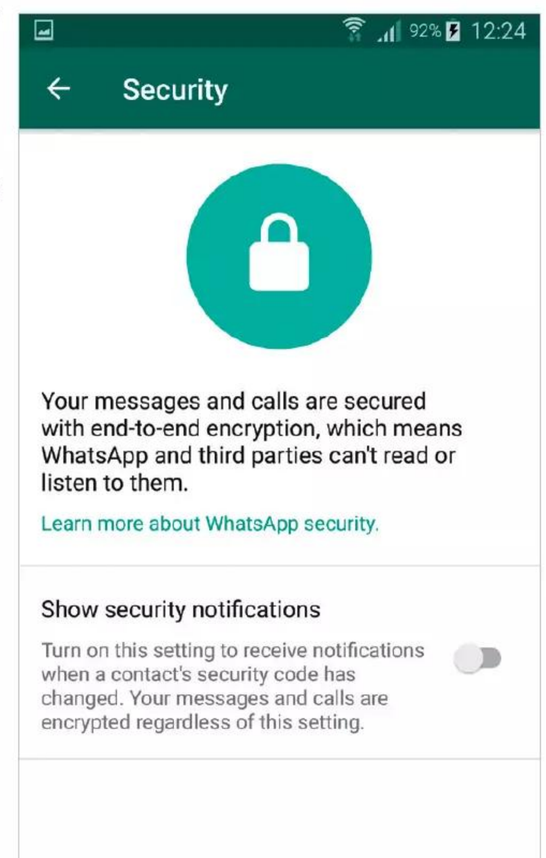
There's plenty you can do to improve your privacy and security and remain safe when using WhatsApp. Here are ten tips for teens and parents when using this popular app.

According to WhatsApp's terms, the minimum age needed is thirteen years old before a young person is allowed to use the service. Thankfully young teens are only able to contact those who they have added to their WhatsApp account but it's best to occasionally check their contact list in case of someone unknown being added.

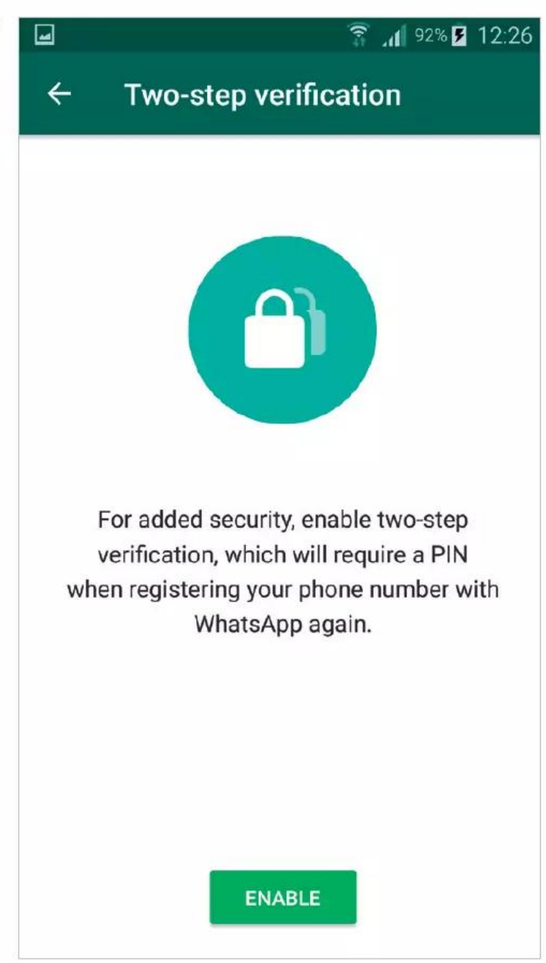
Tap the three vertical dots in the top right of the WhatsApp interface, followed by tapping the Settings option. Now tap the Account option, then Privacy. In here you're able to limit the amount of personal information a contact can view, as well as block any contacts.



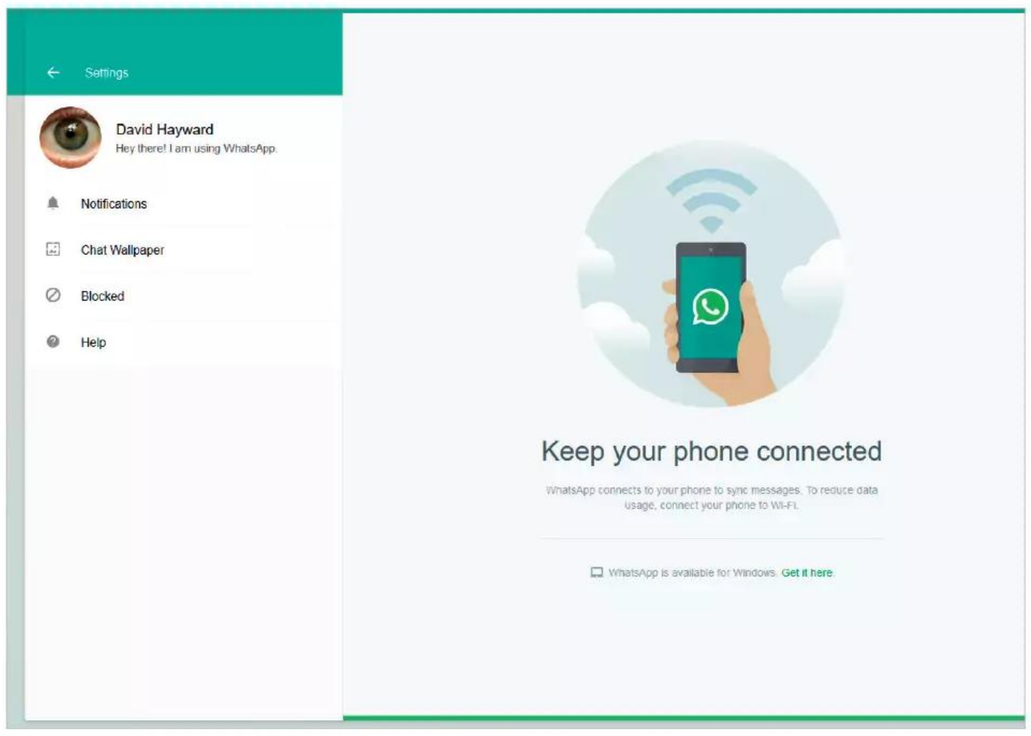
WhatsApp has a high-degree of encryption and security already built-in; however, by tapping the Security option within the Account option, you're able to display any security notifications that may crop up from time to time.



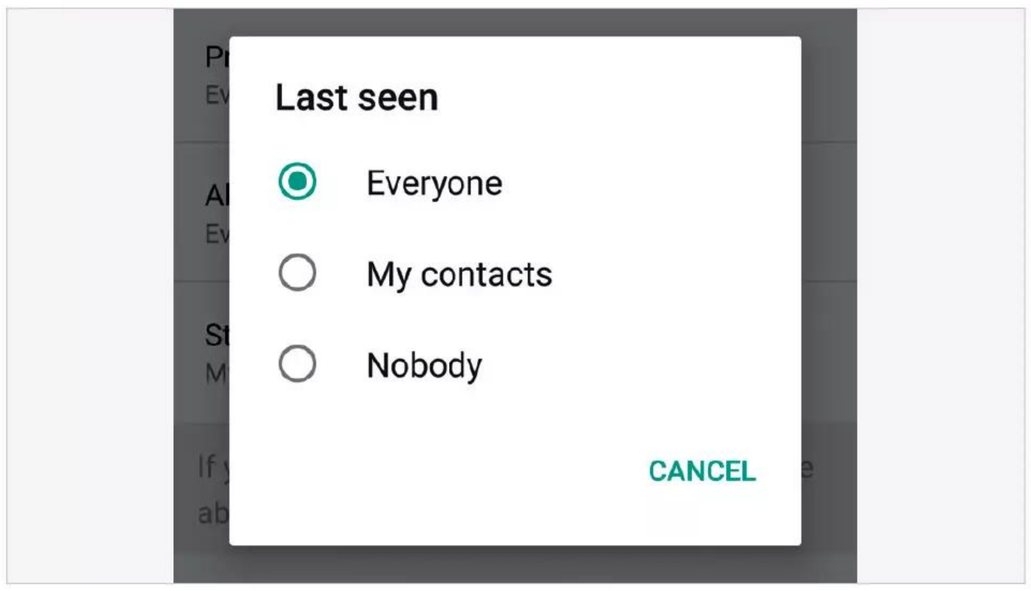
Again, from the Account option, tap on the Two-Step Verification setting to set up a PIN in addition to your usual login information. This will enhance the security of your WhatsApp account, should you ever lose your device.



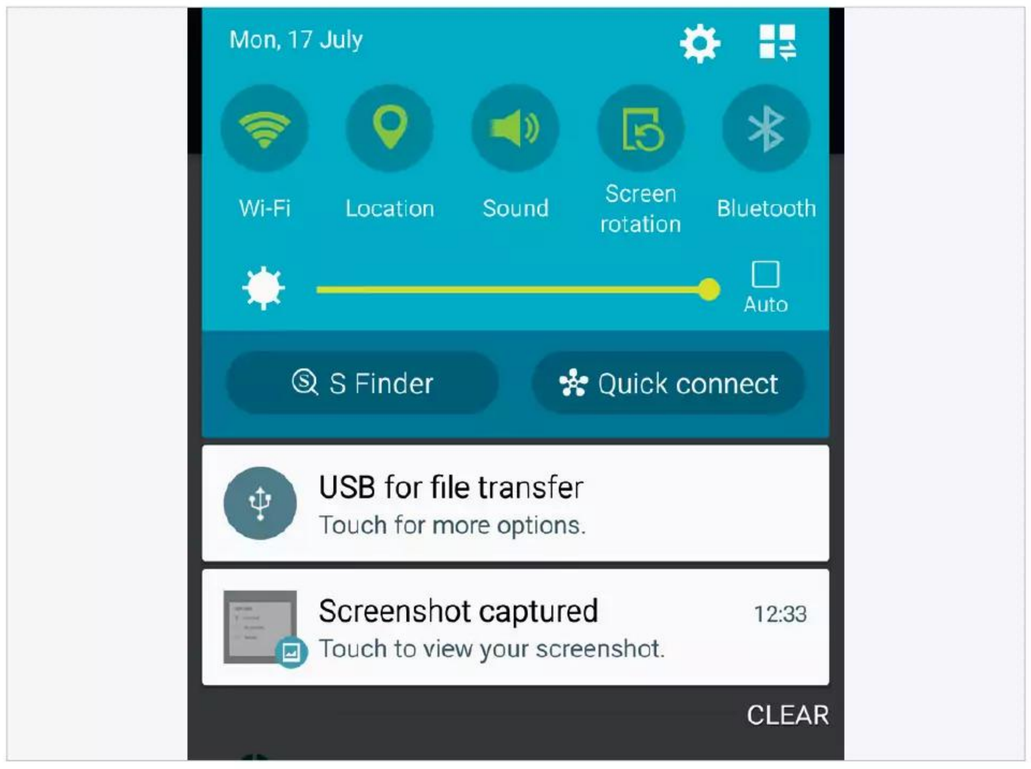
If you're using the web version of WhatsApp, click on the three vertical dots, followed by Settings. Although not as comprehensive as the app's settings, you can set up your notifications and block any users if necessary.



Back to the Privacy settings in the app's Account option, don't forget to limit the Last Seen setting. The three options available are: Everyone, My Contacts and Nobody. This will prevent contacts from seeing where you were when you posted any content.

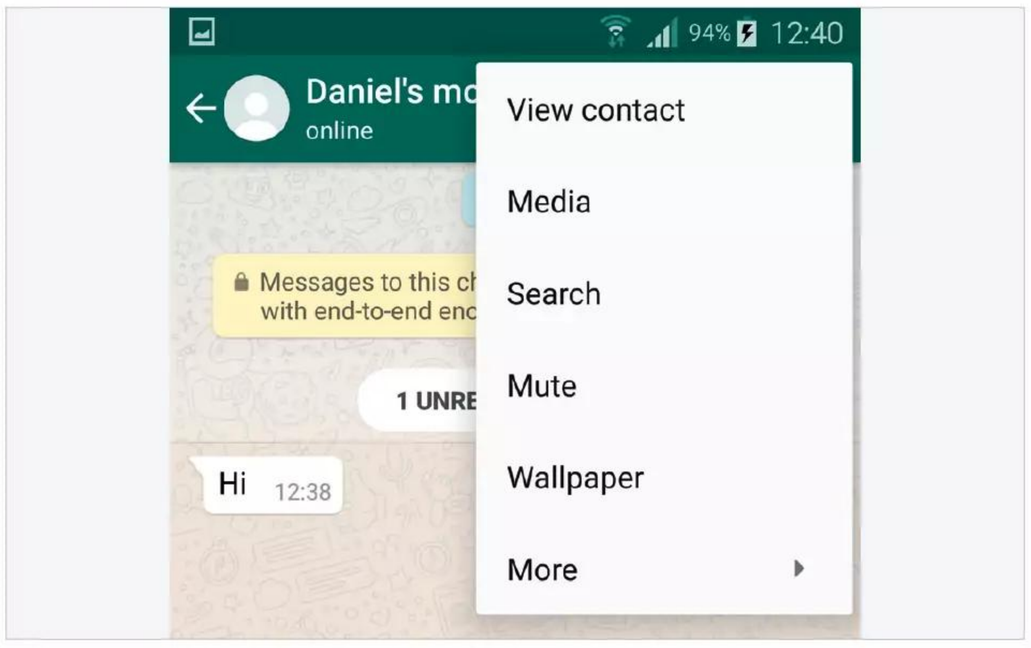


WhatsApp also utilises the device's built-in Location feature. This enables geo-tagging of content as it's uploaded. If you want to upload something but want to make sure that nobody knows where you are, quickly tap the Location function on your device to disable it before uploading.

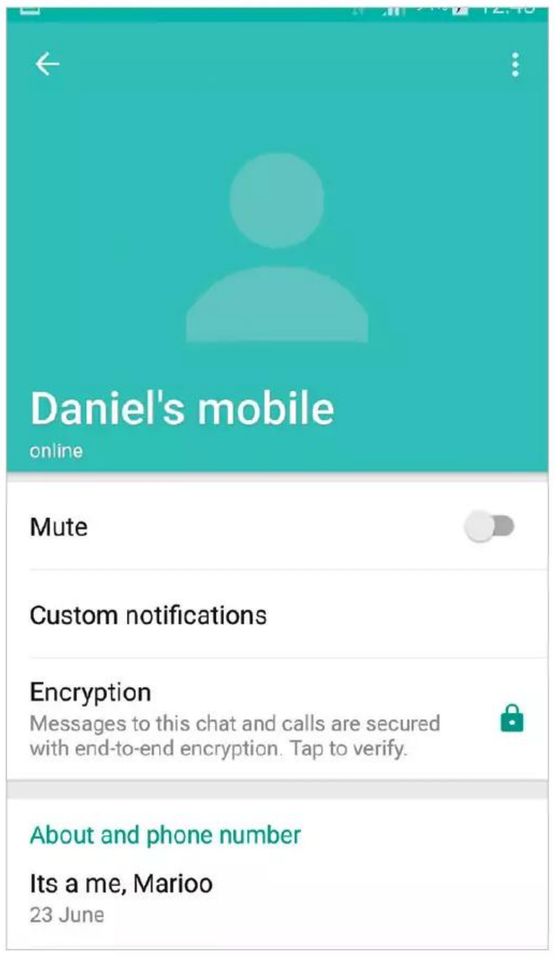


If someone becomes aggressive or starts to bully you in WhatsApp, take a screenshot and record the evidence, then approach a parent and guardian and show them what's going on. Don't respond to the person and don't block them immediately. Always talk to a parent or guardian before doing anything.

Any contacts that send you a message can be blocked, muted and the chat content cleared or emailed if needed. Just open the message, tap the three vertical dots and select the appropriate option from the menu.



Once you have a message open, long tap the contact and you can see the contact's information. From there you're able to block them, report them as a spam user, mute them or even verify that the messages sent are fully encrypted.



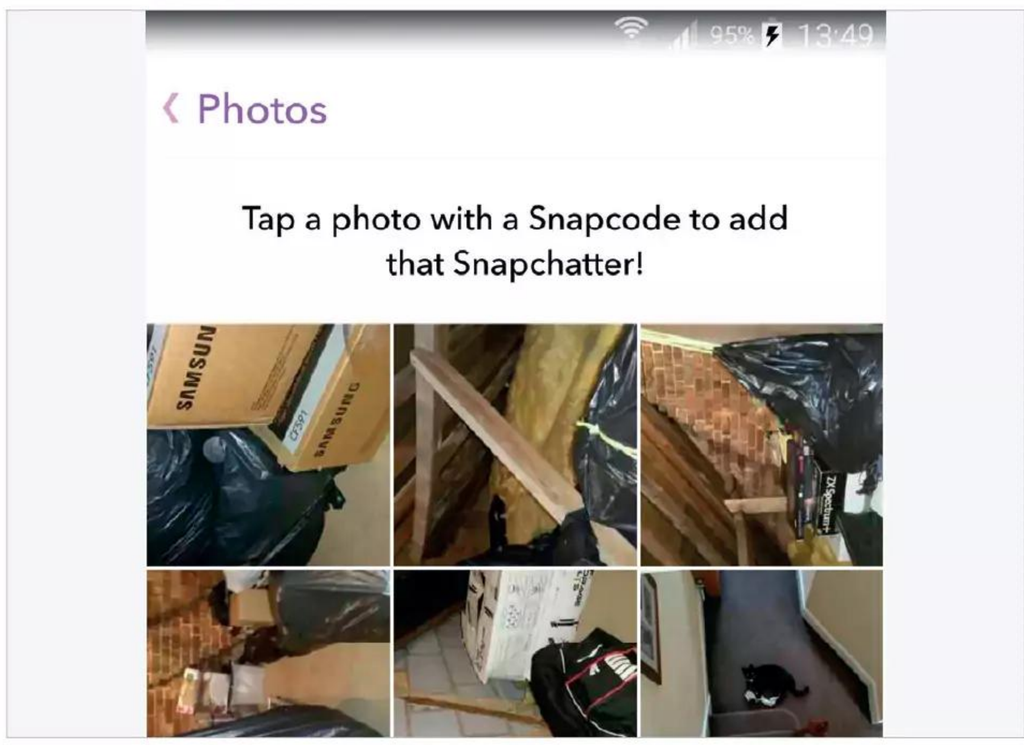
Staying Safe with Snapchat for Teens

Popular amongst young teens, Snapchat has continually raised its appeal by offering alluring features at the cost of security and privacy. The most recent update (at the time of writing) is Snap Maps, a feature that tells everyone where you currently are.

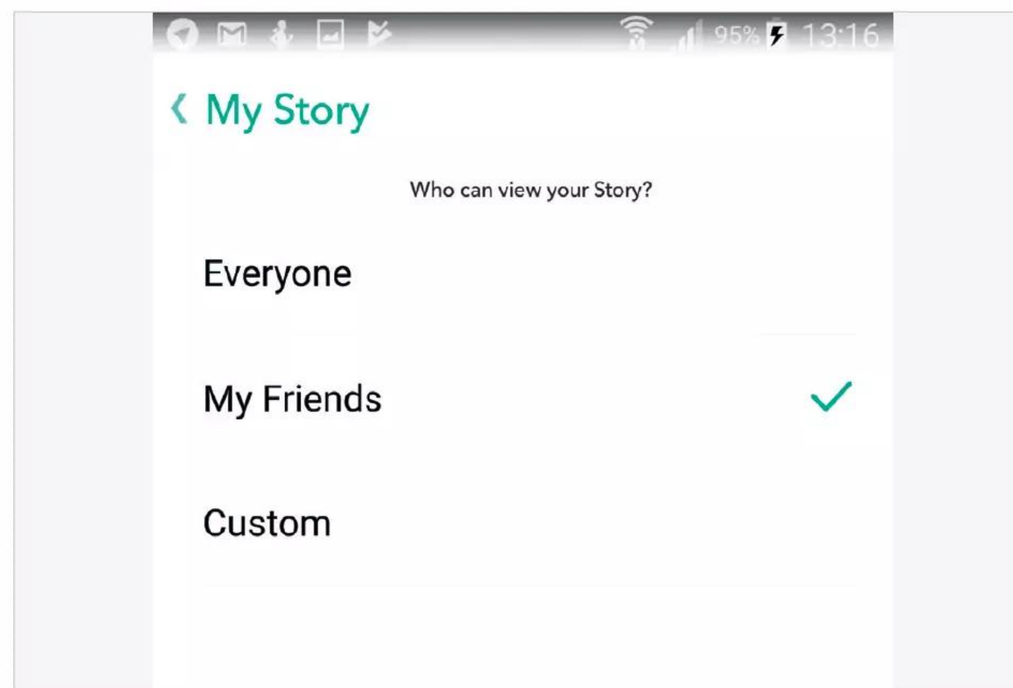
Safety Snaps

Snapchat has some useful features but also some slightly scary security issues. It's best then to make sure that you're as safe as possible when using it.

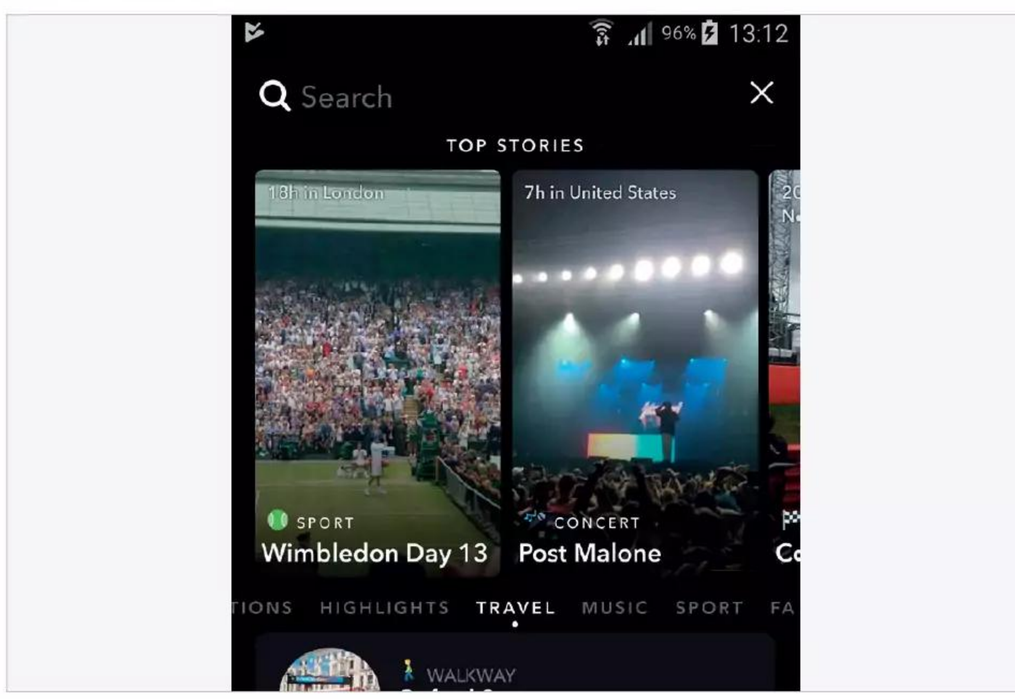
Parents: Take the time to look through your child's Snapchat contacts. Together you can limit who can see what and who can contact your child through Snapchat's various functions.



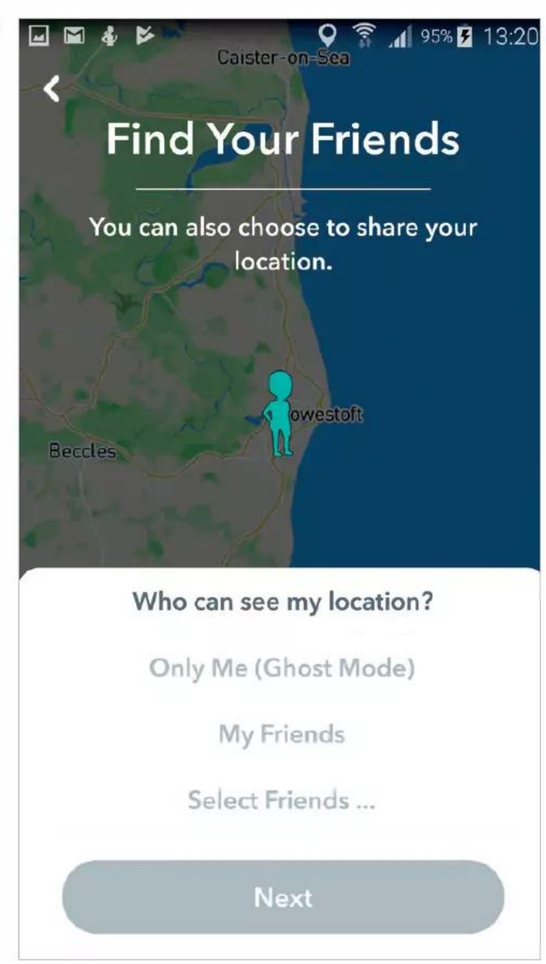
You can create your own Snapchat Stories, by tapping the three dots in a triangle in the bottom right of the Snapchat interface. Make sure that you also tap the cog icon in the top right within Stories, in here you'll be able to limit who sees your stories. Try and avoid choosing Everyone, if possible.



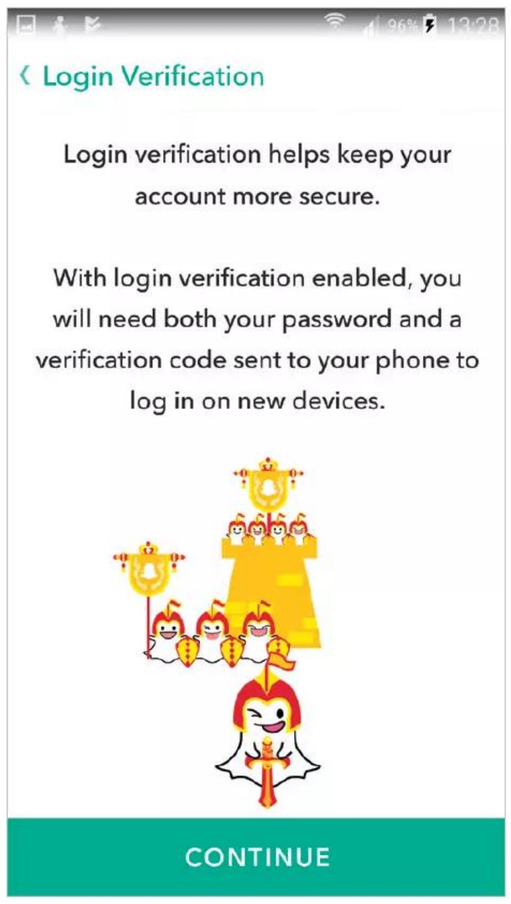
Tapping the magnifying glass icon will open the global Snapchat Top Stories. From there a user can search for something specific or view any Snapchats via the various headings. Be careful here, there's a lot of inappropriate content out there, along with dubious individuals who would like your information.



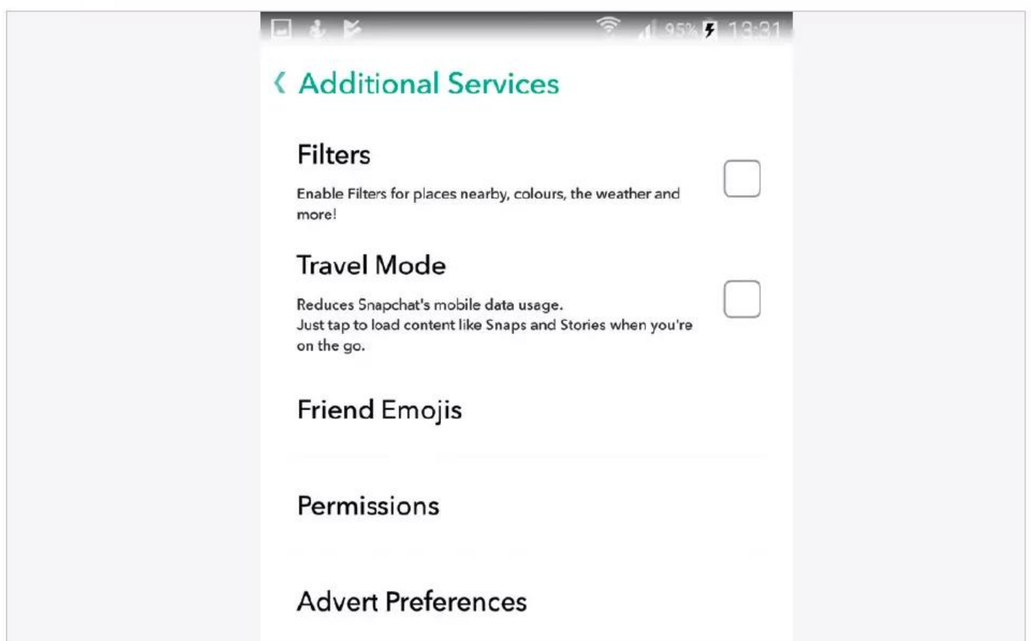
Snap Maps is the newest feature to Snapchat, one that enables other Snapchat users to see where you are in the world. To open it, pinch your fingers like you're zooming out from the camera screen. When asked, you're able to set who can see your location. Always ensure you know your friends, or enable Ghost mode for better privacy.



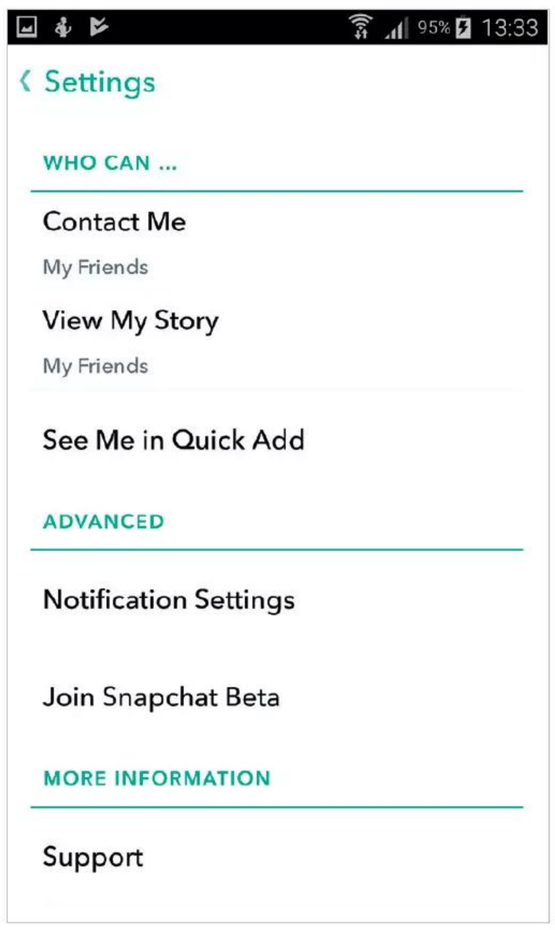
Tap on the Snapchat icon, followed by the cog in the top right to access your account settings. Scroll down a little way to Login Verification and tap it. This is a two-step authentication process that requires both a code sent to your device, as well as your login details to open Snapchat. Useful if you ever lose your device.



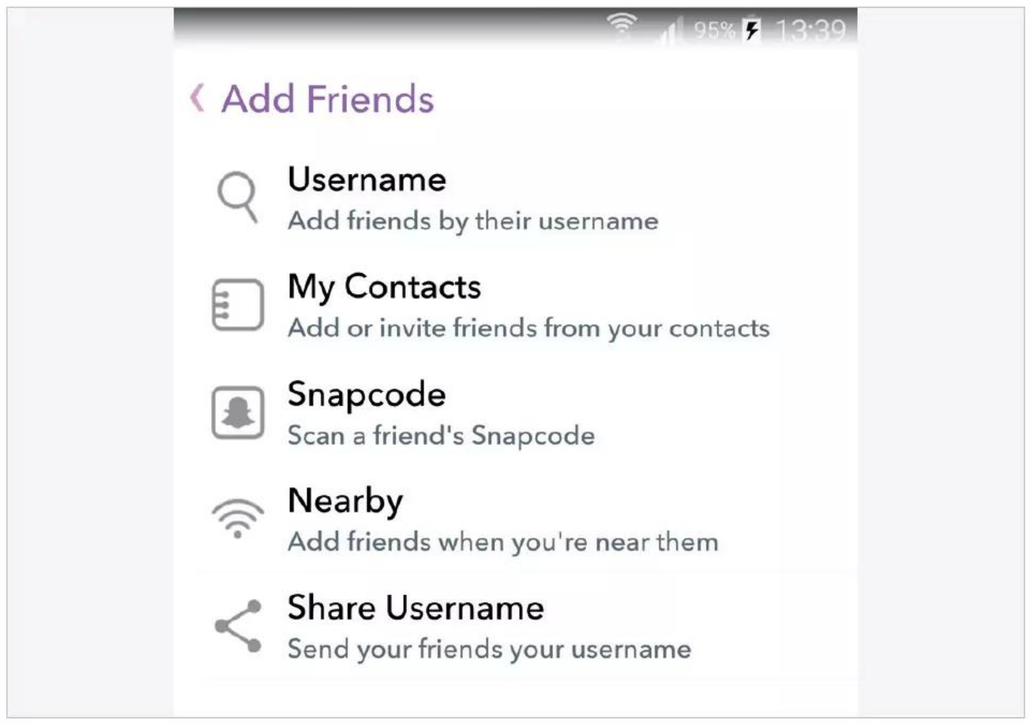
Whilst still in the account settings, scroll down to Manage Preferences under the Additional Services heading. In here you can limit the mobile data use and enable filters for nearby places, change the app permissions and advert preferences.



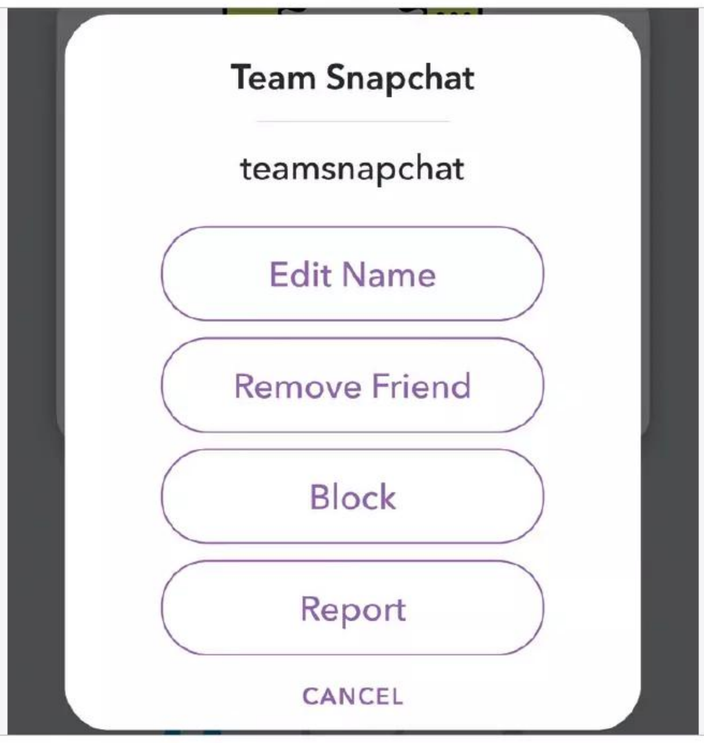
Under the Additional Services heading, the Who Can... heading enables you to specify who can contact you or see your Stories. It's best to limit your account so only friends are able to see you or any posts you make, as opposed to the Everyone option.



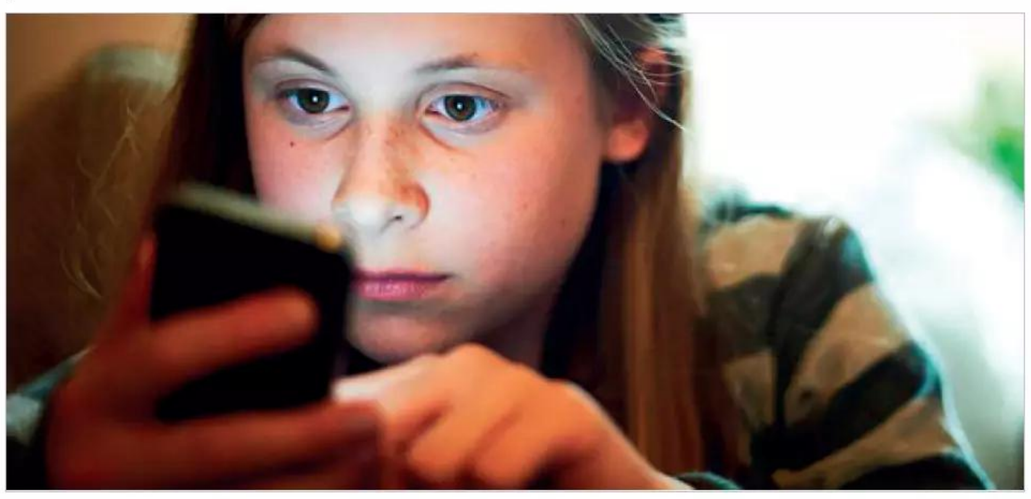
Be wary of the Add Friends function in Snapchat. From it you can add friends in your contacts list, any that have sent you their Snapcode, shared friends lists, or you can opt to locate other Snapchat users based on whether they're nearby. Obviously this is a privacy and security concern, so be aware of it.



You can easily remove friends, block and report other Snapchat users by long pressing the contact or Snapchat feed and selecting the option from the menu. Make sure you've taken any screenshots of inappropriate content before blocking, to use as proof if reporting the contact.



Just as with all social media platforms, if you're uncomfortable with the content or messages that someone is sending you, tell a parent, guardian, teacher or other responsible adult. Don't respond, don't send anything to them and always think before posting any images of yourself and your location.



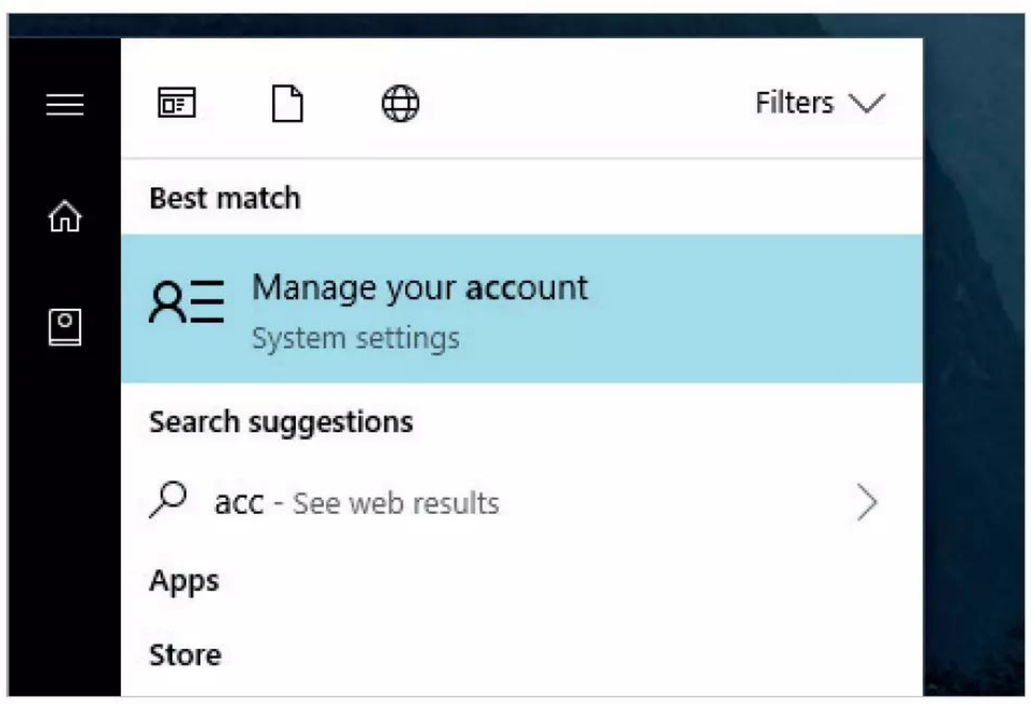
Creating a Child Account in Windows

If you're sharing a Windows computer with your children, or they have one for themselves, then setting them up with their own account will work better for you both in the long run. A Windows child's account gives them freedom, and you can set up certain restrictions.

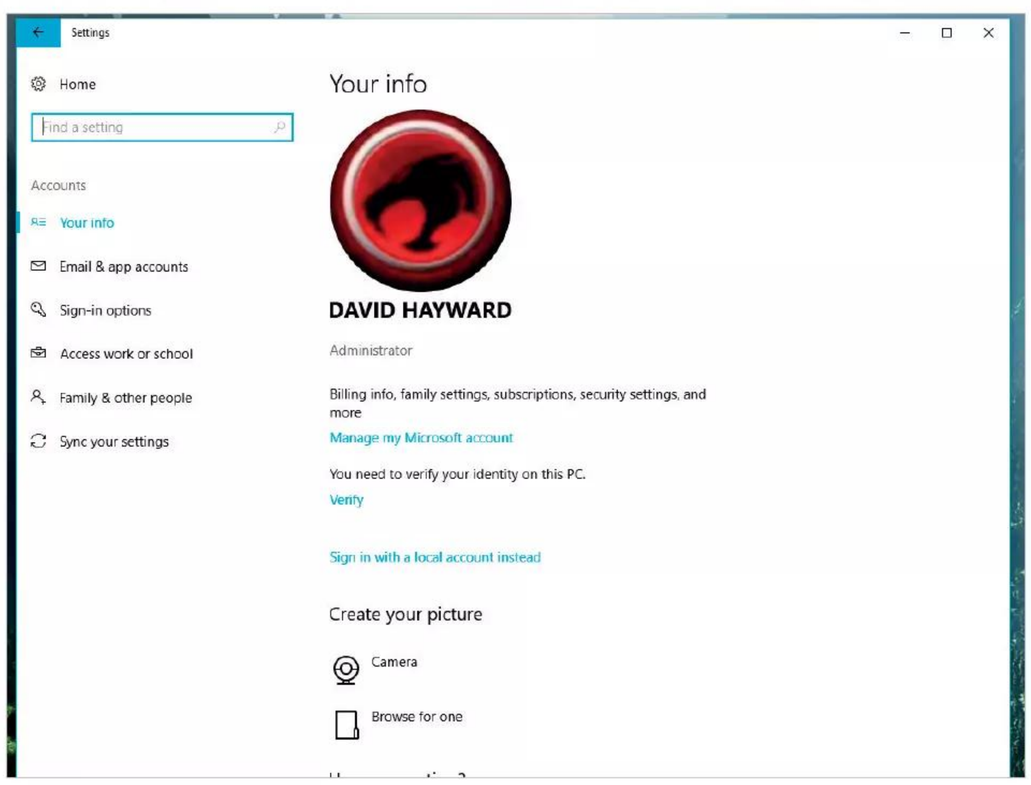
Windows for Children

With a Windows child account you're able to set up age restrictions, time limits and ensure they're not visiting sites or using apps they shouldn't.

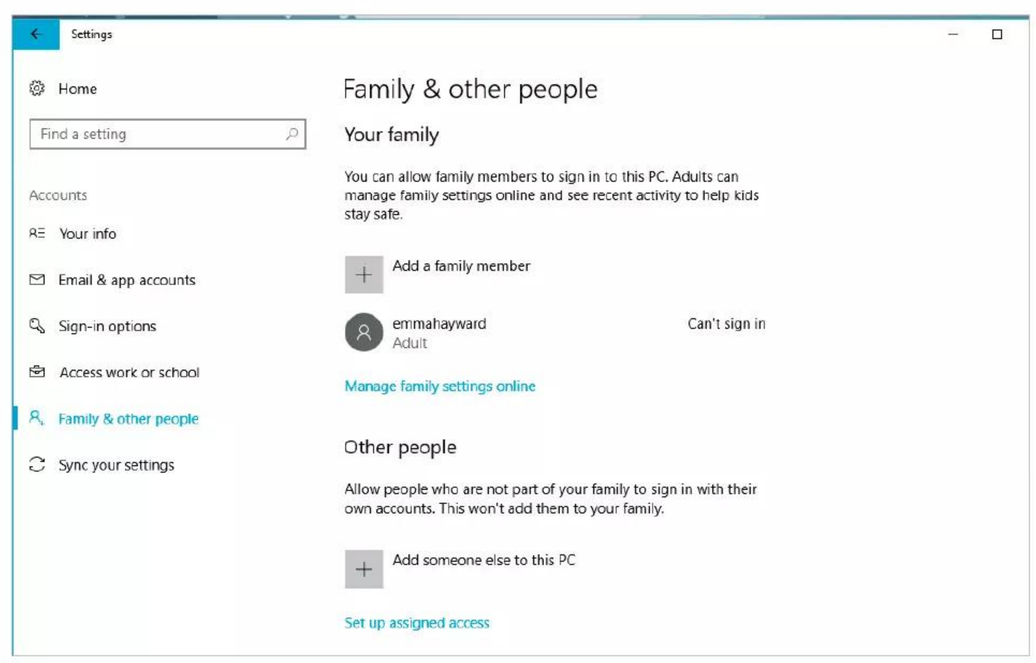
STEP 1 Start off by clicking the Windows Start button and typing 'account'. The first result that should appear is Manage your account, if anything else appears, maybe you have some work labelled 'account', then scroll down until you find the Manage your account option.



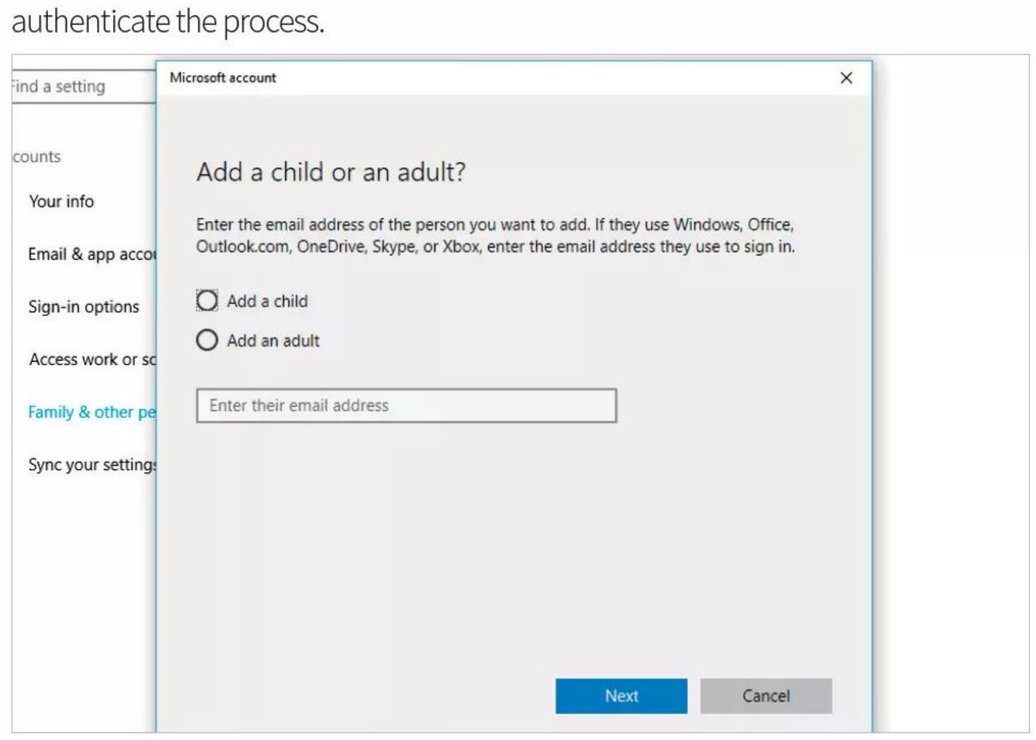
STEP 2 You now find yourself at the Windows Settings page, in the Accounts section portal. Notice there are links down the left-hand side, look for the Family & Other People link and click it to continue with the process.



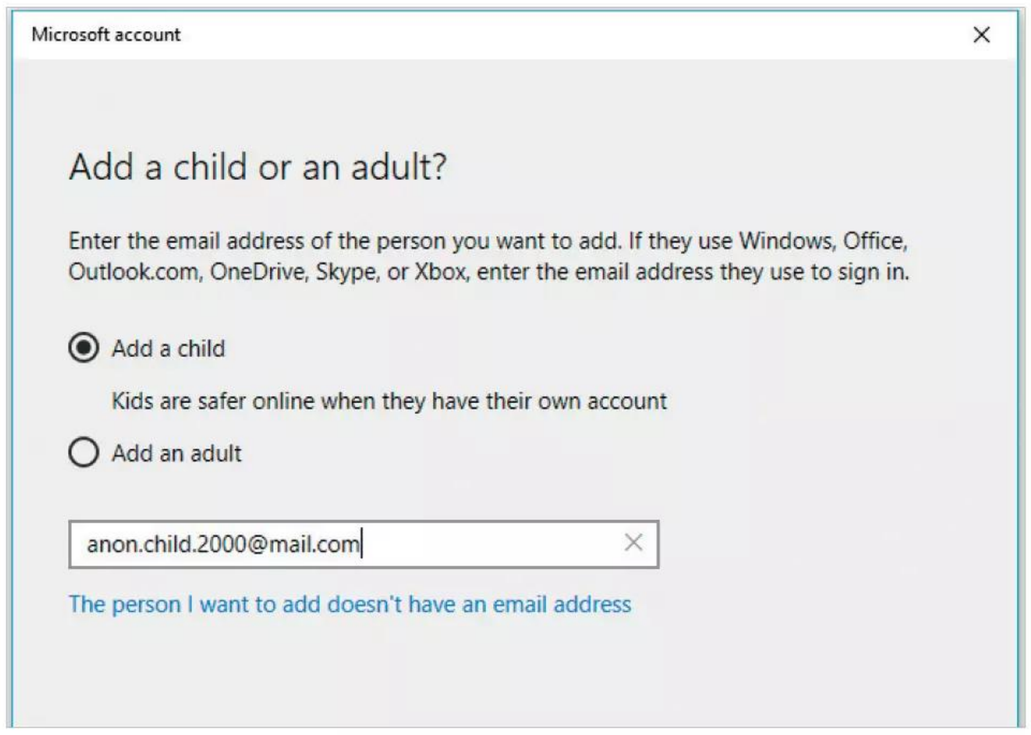
STEP 3 You need to sign in with a Microsoft account for this to work. If you've not already set up a main Microsoft login account for Windows, you'll need to click the Sign in with a Microsoft account option. Once done, you're presented with the current family members who already have MS accounts.



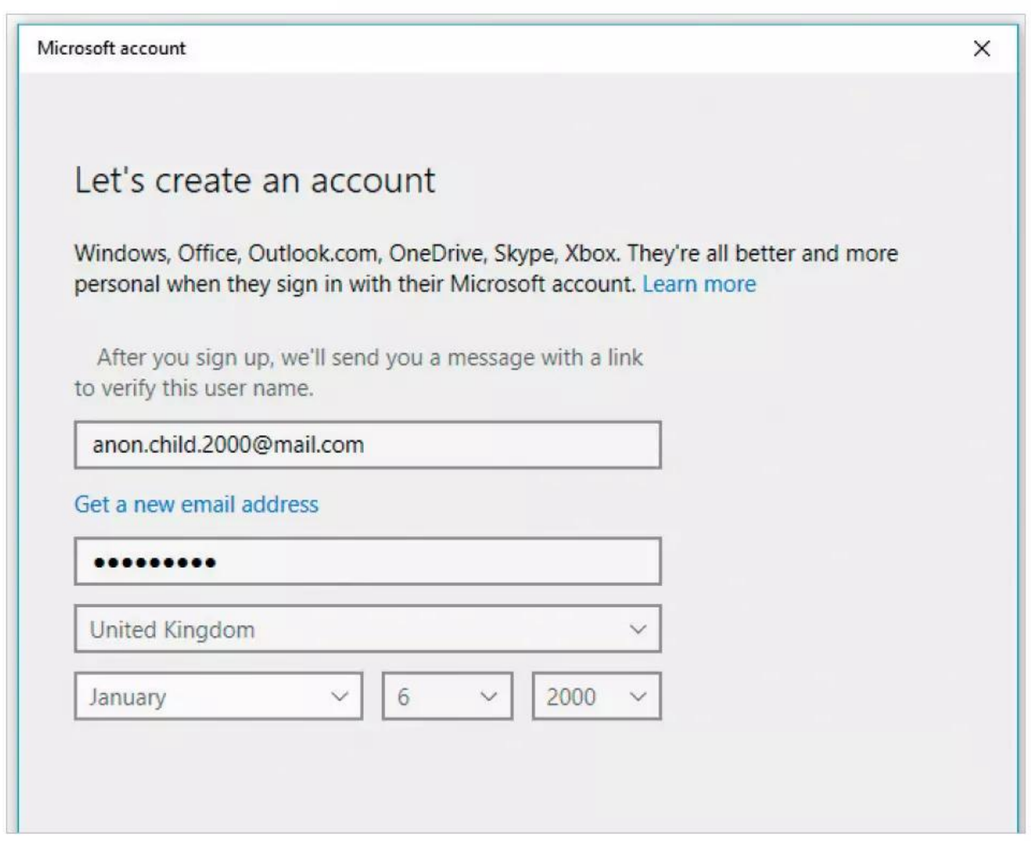
STEP 4 Next click on the Add a Family Member link, next to the plus sign under the Your Family section. This will launch a new pop-up window to create a new Microsoft account. You need to make sure that your child has an email address and that you or they currently have access to it to authenticate the process.



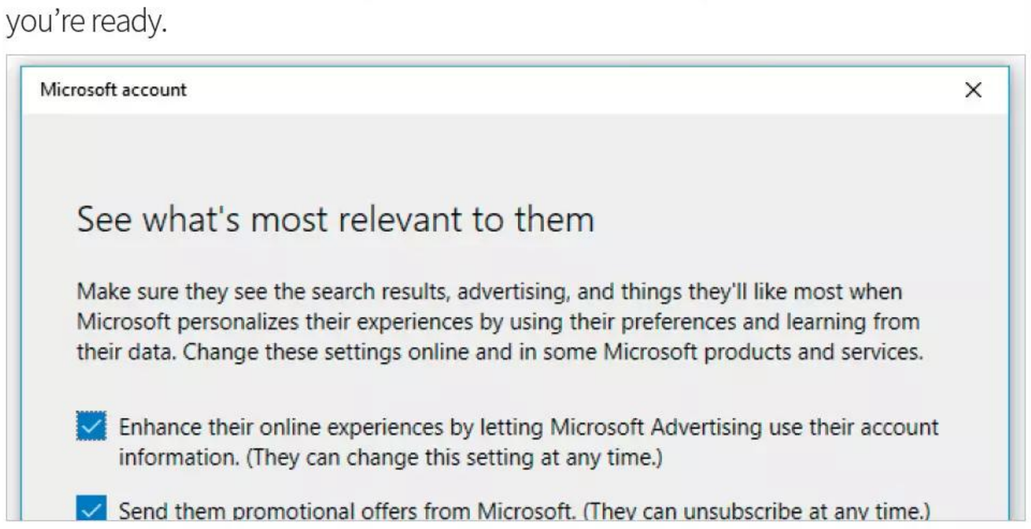
STEP 5 Click the Add a Child option in the new account window and enter their email in the text box section below. When you're ready, click on the Next button.



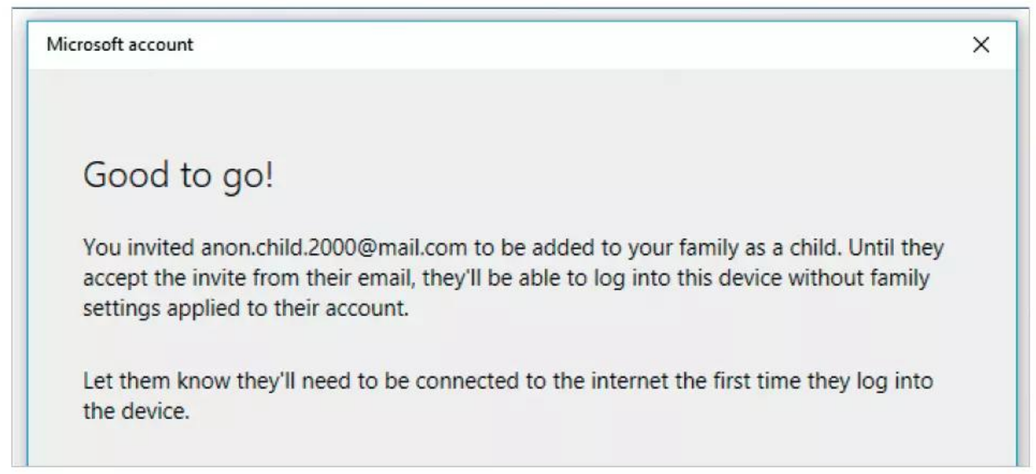
STEP 6 You now get the message that it's not a Microsoft account, click the link to Create a Microsoft Account. This will bring you to a new window with the email address you've entered already filled in. Complete the relevant details and click the Next button to continue.



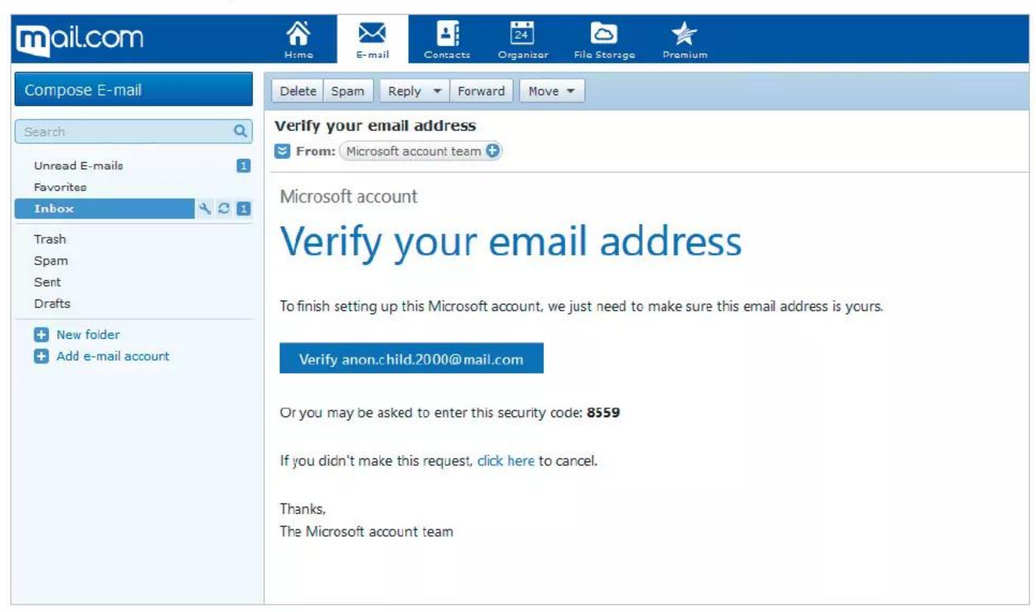
STEP 7 The next section details what level of search and advertising Microsoft will allow to the account. Obviously you can untick both boxes or leave them as they are, it all depends on what you want. However, for the sake of enhanced privacy, we recommend unticking both. Click Next when you're ready.



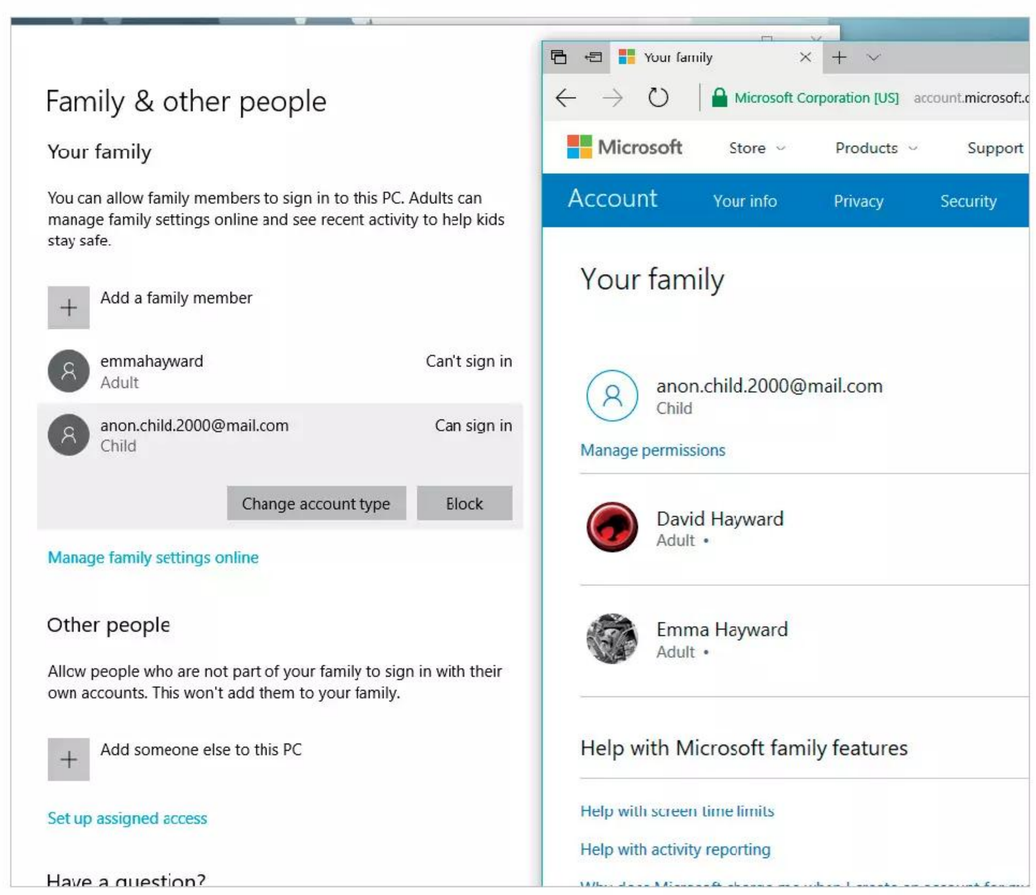
STEP 8 The child's account is now ready to be activated. The message box informs you that you need to respond to the email Microsoft has sent before they're able to login in to the Windows computer. Click the Close button when you're ready.



STEP 9 Microsoft will send some emails to the child's account. One will be a Verification email, and you, or your child, will need to click the link to activate the account; they need to login to Microsoft online to complete the process. The other email will be an invitation to join the family account, which you also need to Accept.



STEP 10 Using the child account to join the family will send emails to you confirming the accepted invitation. Back at the Windows Family & Other People window, you can now click the child's account and allow it to login, or manage it via the Microsoft Family portal online, which we'll look at in the next tutorial.



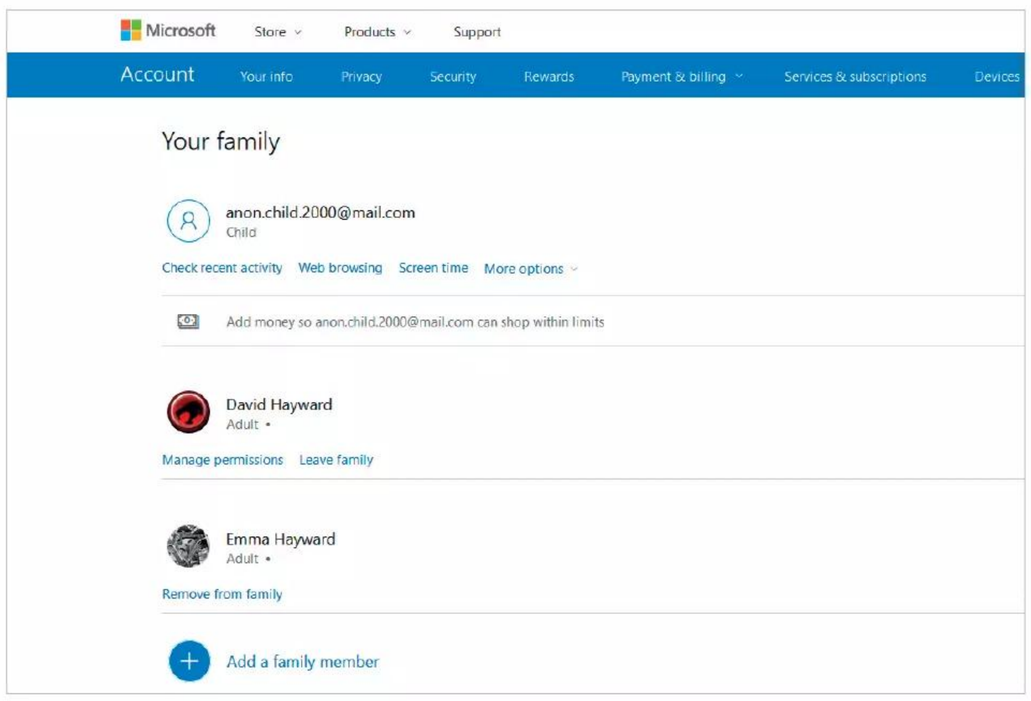
Windows Family Features

Microsoft's Family portal is a continually updating service that allows you to monitor, control and share features across Windows machines and Xbox consoles. It's designed to help share calendars, set screen times for games and set up safe browsing.

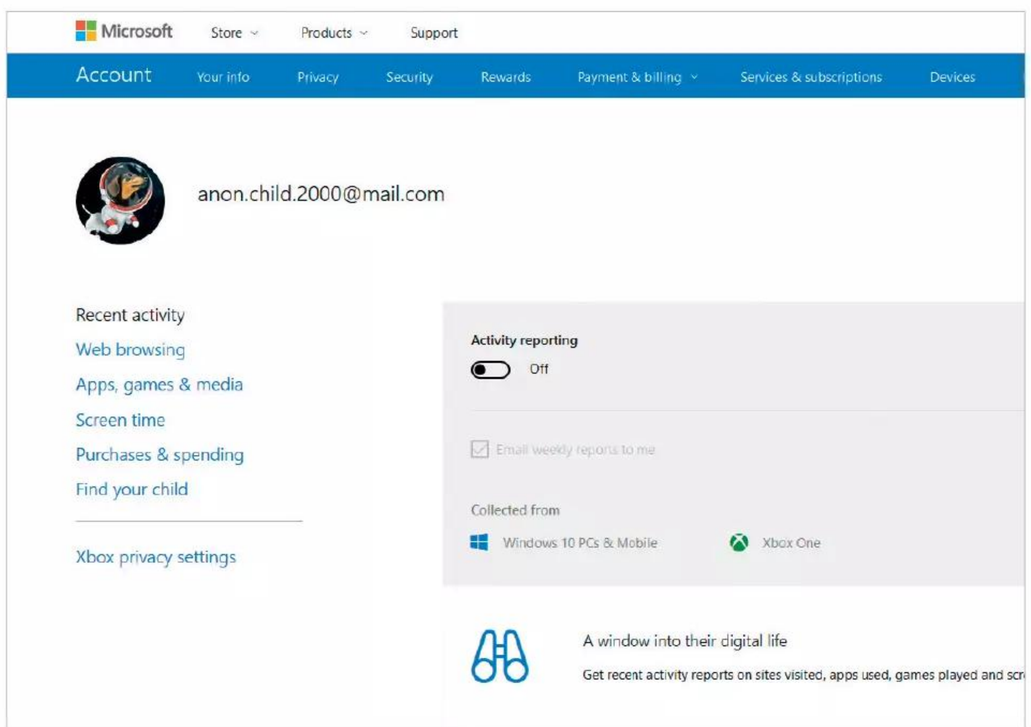
Happy Families

The Microsoft Family portal is where you're able to set the various features. First, you need to browse to https://account.microsoft.com to login with your MS account.

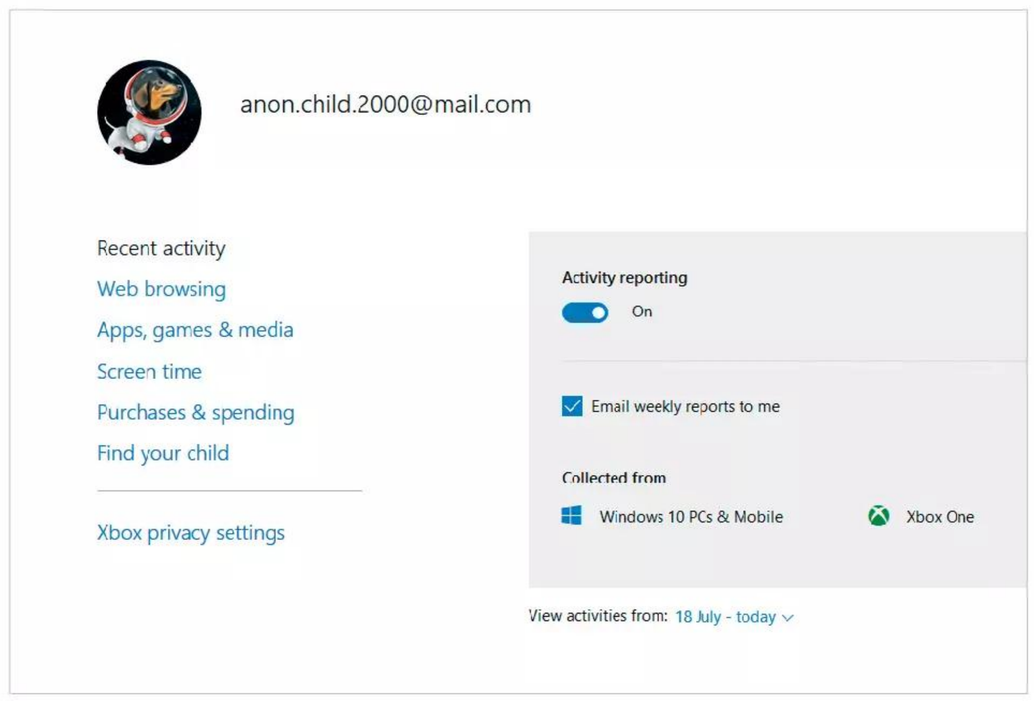
STEP 1 When you've logged in to the Microsoft account online, click on the Family link found along the top set of menu options. This will display the current members of your Microsoft account, adults and any children you've added, as per the previous tutorial.



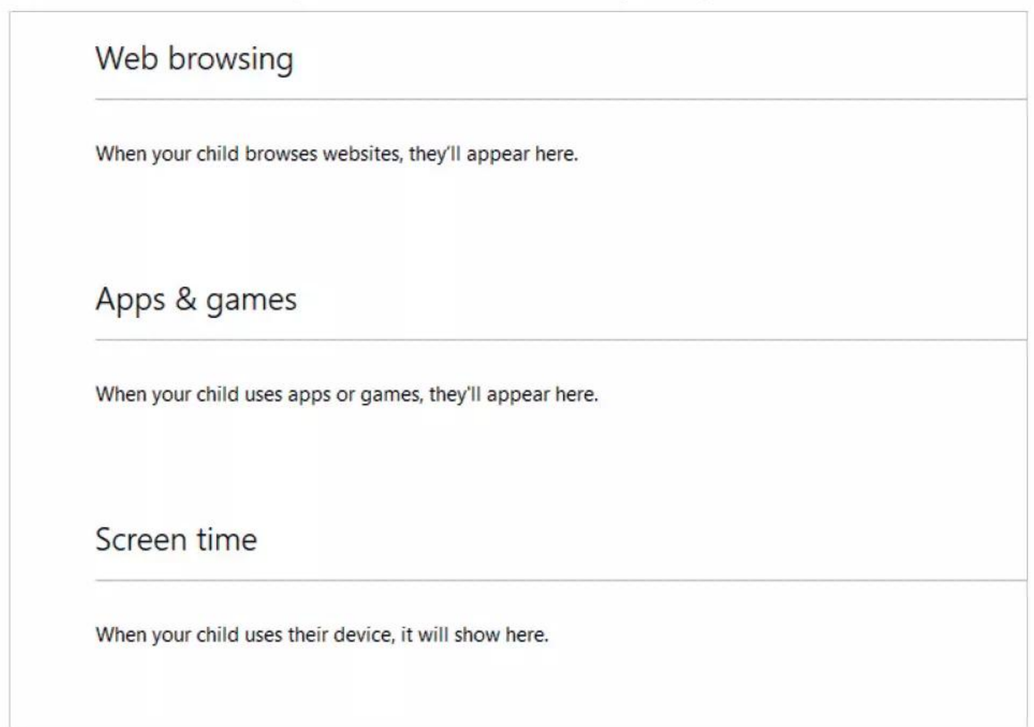
STEP 2 Under the child account you can see four options: Check recent activity, Web browsing, Screen time and More options. All the options can be accessed by clicking on any of the links, so to begin with, click the Check recent activity option.



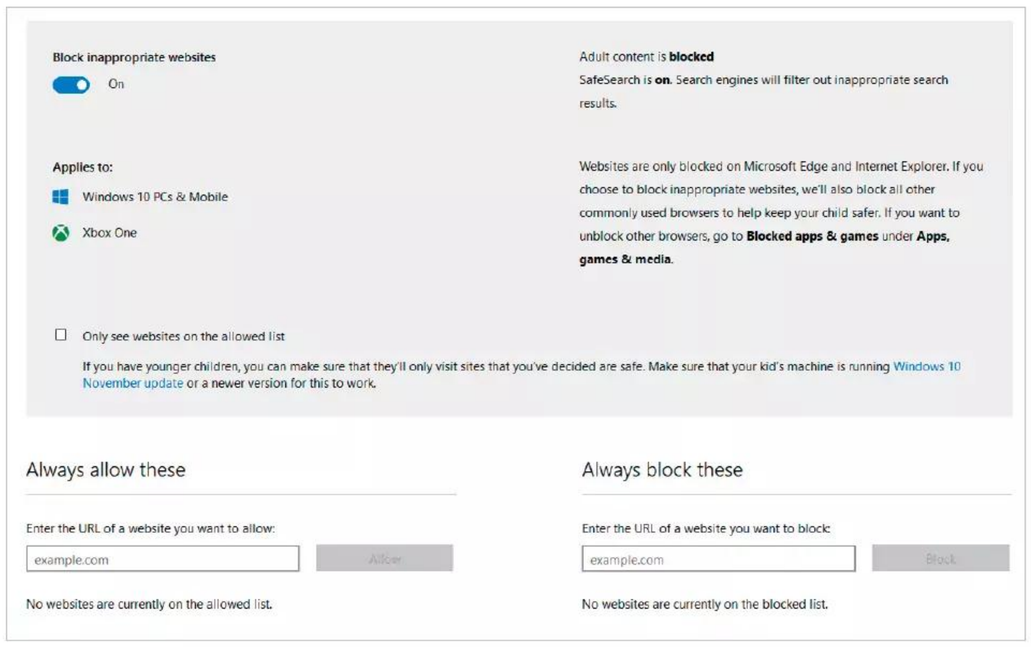
STEP 3 Being a parent or guardian, you can set Activity Reporting for any of your Microsoft child accounts. Click on the Activity reporting slider to the On position; this will instantly block InPrivate browsing within Microsoft Edge and start to collect data on their online activity.



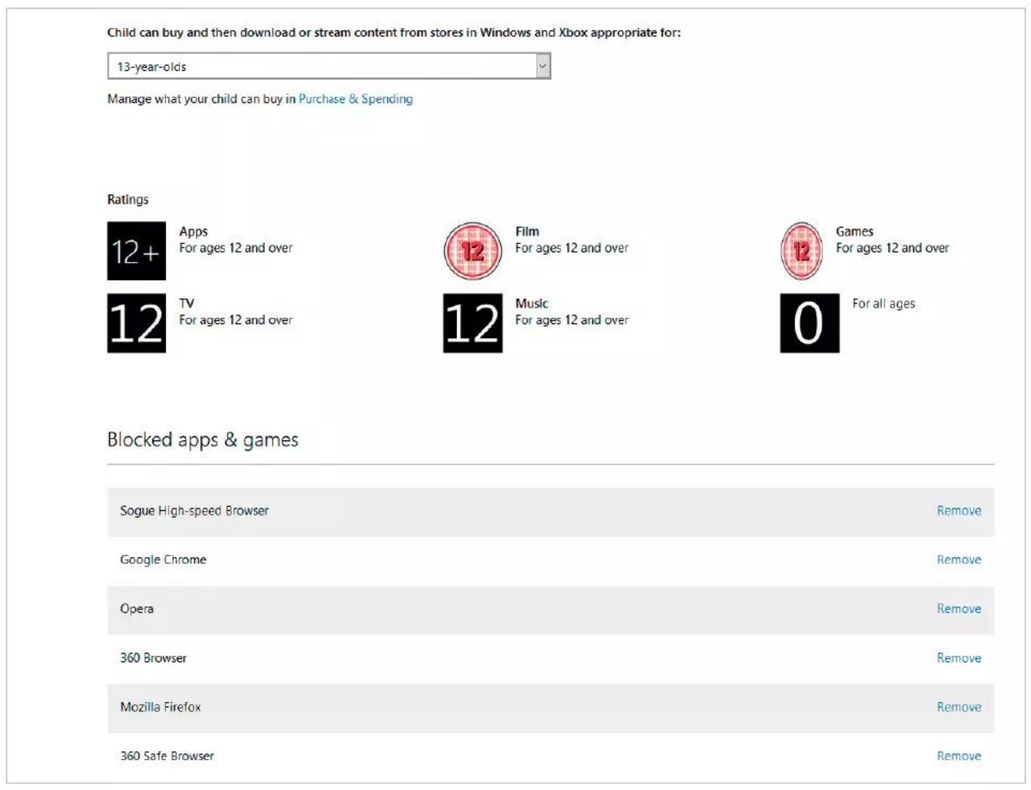
STEP 4 Under the Activity reporting, you can see sections for Web browsing, Apps & games and Screen time. To the right of each title are links to set up web access blocking, game and app blocking and so on. Click on the Turn on blocking link next to Web browsing to begin with.



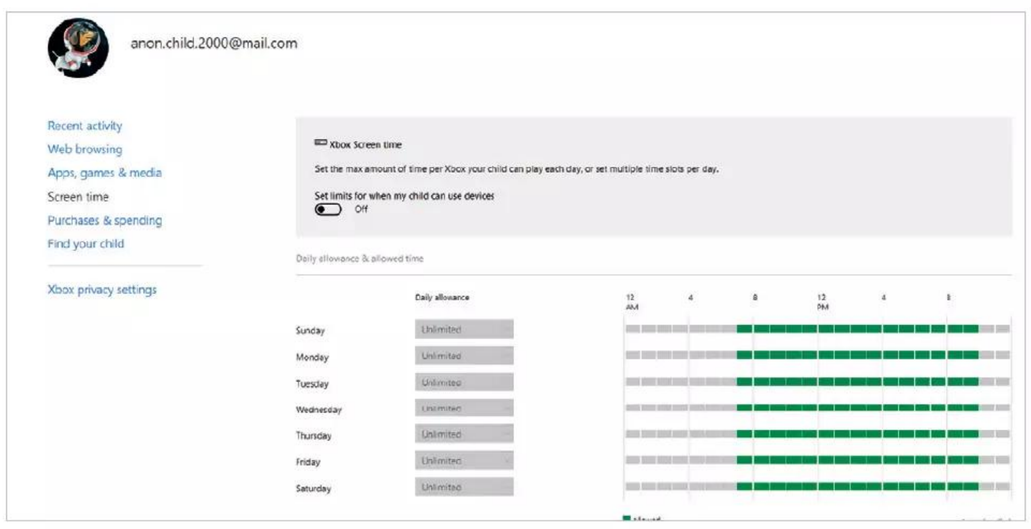
STEP 5 Providing the child uses Microsoft Edge, you can set Windows to automatically block any inappropriate websites by clicking the slider in the Turn on blocking link to the On position. By default, Microsoft will block all inappropriate sites but you can also specify an allow and block list of sites yourself.



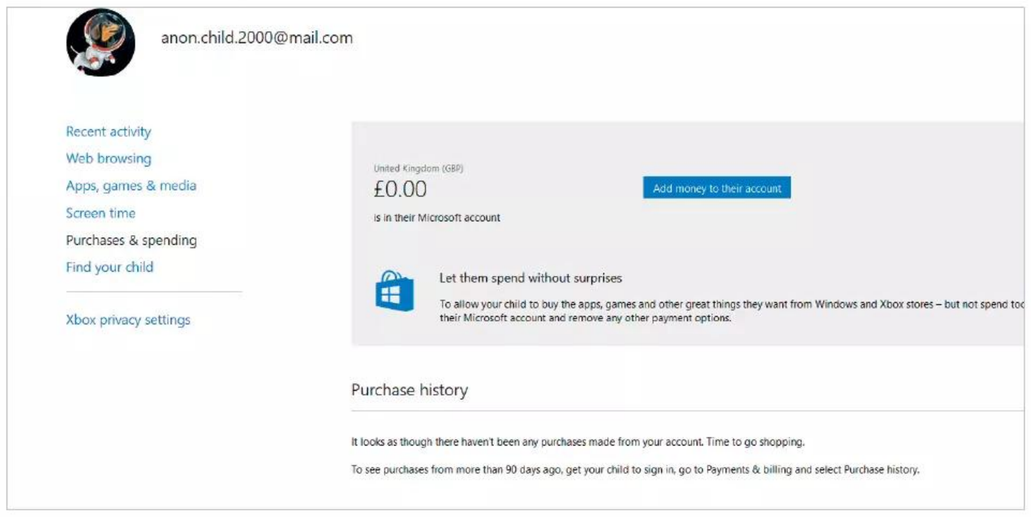
STEP 6 Click on the back button in your browser to return to the previous page. Now click the Apps & games section and the Changing settings link. In here you can set age-specific restrictions on apps and games, as well as block certain programs from running, such as another browser, forcing them to use MS Edge instead.



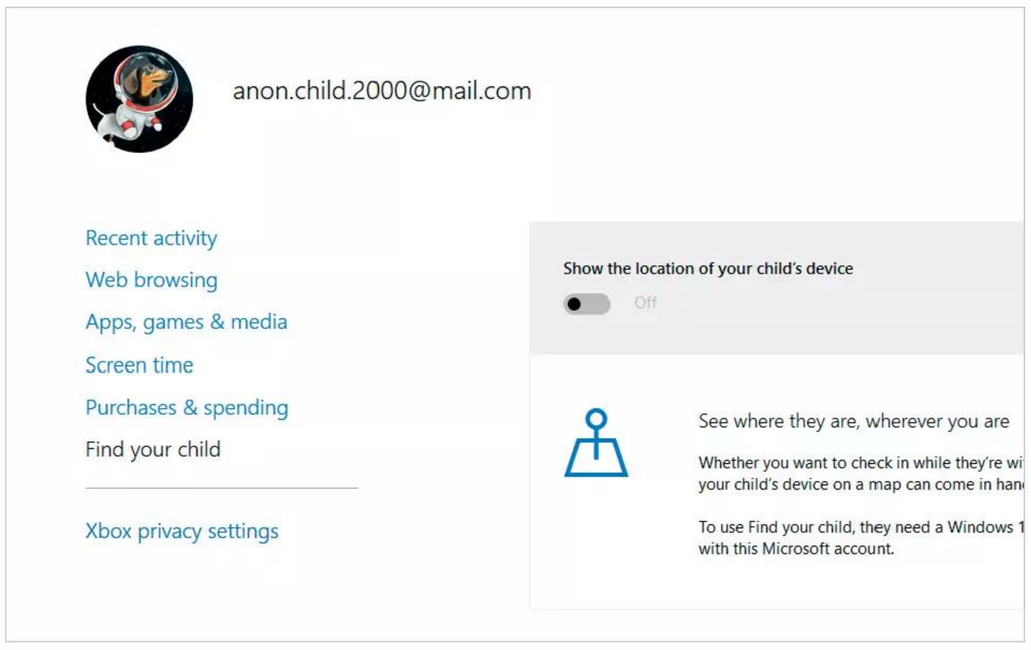
STEP 7 Screen time, found on the link to the left under the child's account name, will allow you to set time restrictions for the child. These restrictions will work for Windows computers and devices, as well as Xbox consoles.



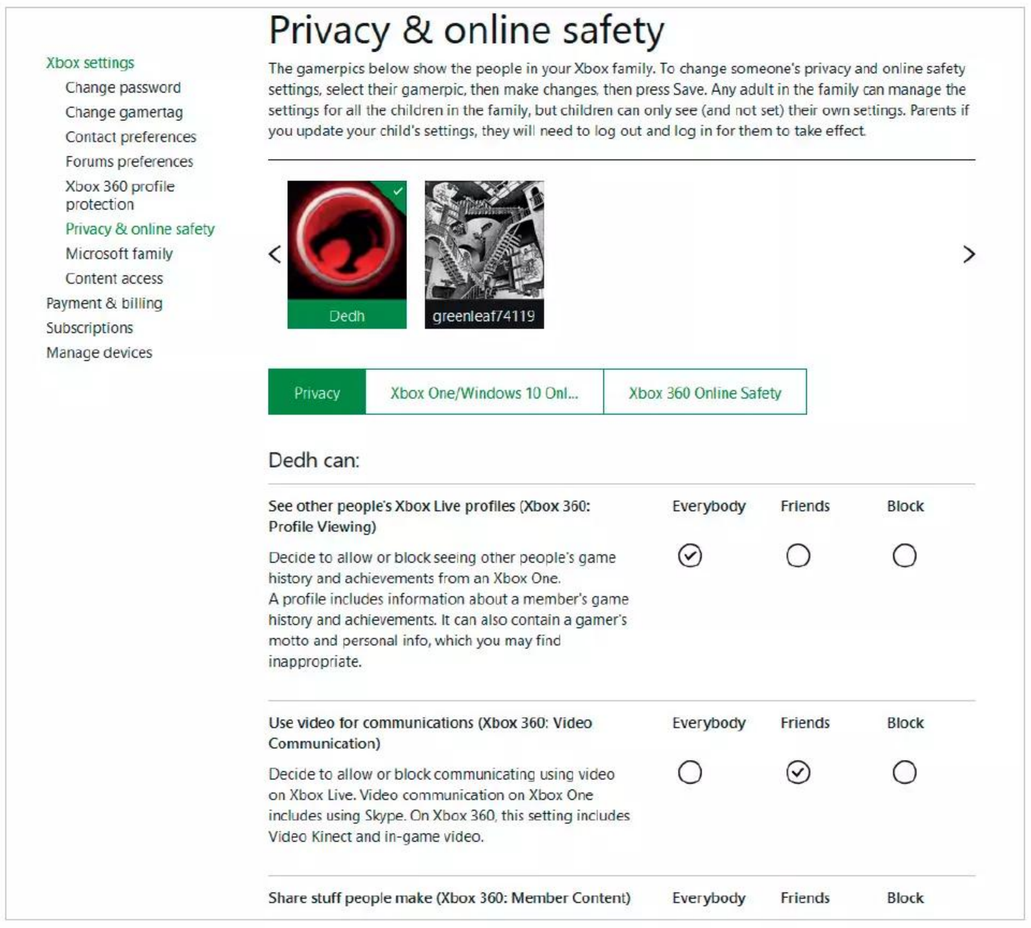
STEP 8 Purchases & spending is an interesting option and something which we'll be looking at in the next couple of pages. In here, you can specify a spending limit on the child's account as well as view their purchase history.



STEP 9 The Find your child setting works only with Windows Mobile devices. With it, you're able to locate your child or rather their device, within just a few metres via a handy map. Useful for if they lose their device or just checking in on where they are.



STEP 10 If you own an Xbox One or Xbox 360, you're also able to set up any Xbox Privacy settings from within the Microsoft Family portal. You can specify video chat, viewing of profiles, sharing and other forms of communications from the console.



Problems with In-app Spending

The Internet is awash with horror stories from parents who have discovered that their child has spent an impressive sum on a game without their consent or knowledge; but, just how much of a problem is this in-app spending issue?

In-app spending is a modern scourge for parents, guardians and even the children and young people themselves. From the point of view of the parent or guardian, we have a child who enjoys playing a game, regardless of whether it's a mobile game, console game or triple-A rated PC game and we're more than happy to allow them to play the game without any restrictions, after all it's just a game, right? However, when those parents then receive the bill from their credit card company, or a call from the bank, that their account is now several hundred or even thousands of pounds lighter, that game has suddenly become the bane of their existence.

From the point of view of the child, they have an incredible and addictive game in front of them. They've put in the hours of game time to achieve a certain level but to get any further in the game, or to beat an end of the level boss or something, they need an extra push. That push can come in the form of more powerful spells, weaponry, armour or whatever else the game requires to boost the player's stats. To get hold of that equipment or bonus content, they need to purchase it from the in-game store. Some of the content costs just a few pounds but it soon lures them into the more expensive extras. Before they realise it, those few pound extras soon add up and the straw that breaks the camel's back is the expensive object that pushes them into the new levels, and causes the parents much angst.

The developers and creators of the game have their point of view too. These developers have spent many hours of coding, testing, re-coding and marketing to help launch their game. It's a painful, exhausting and often expensive process, so the company that launches the game will need to see some good returns if it still wants to continue in business and employing developers, testers and everyone else involved. All these people involved with the game need paying, so if they can top up the business with in-app purchases, added content and such, then why not.

Of course, that doesn't help the parent or guardian who is now looking at their vastly diminished bank account. What there must be is some form of middle ground, where the developers still get paid and the company can keep producing exciting and great games. Here the players get to reach the levels they want and continue playing the game and parents and guardians can safely leave their children to play the game and purchase an upgrade or two, without breaking the bank.

In light of events that hit the headlines, children spending thousands of pounds on purchasing virtual pets, virtual food, more lives etc., the main providers of mobile purchases, such as Apple, Google, Microsoft and so on, started to roll out levels of restrictions to help prevent overspending. These restrictions vary and have improved greatly in recent years; but initially they we're more centred around simple tips and advice for parents rather than the kind of spending restrictions we see today.

Of course, some of the problems also arise when the game in question is clearly a pay-to-win model. It's hardly fair for the young person to enjoy the game when they're continually beaten by those players who can afford to spend the money on extra lives, energy and so on. The pay to play model, on the other hand, requires the purchase of the app before it can even be played. Some experts argue that this is a better model but that's up for debate.

One of the main causes for excessive in-app spending is a child or young person being left alone with the device and game whilst the parent was logged into their own account. The account itself doesn't have any restrictions or password access to get into the online store, after all why would most people continually require password access to their own in-store account; or when the child knows the password and can easily access the store.

The child, left alone, could then go ahead and accept the message from the game that asked 'to continue, buy more apples' (or whatever), which in turn led them directly to the store to place the order in the basket without any kind of confirmation or message stating to check with an adult first.

Most of the time, when these sorts of scenarios occurred, the likes of Apple, Google and so on refunded the parents in question. From there, it became more difficult for a young person to go on an in-game spending spree with their parent's account.

There's a more controlled in-game and in-app spending focus these days but it's still not unheard of for a child to get a little carried away and purchase several hundred on some form of virtual extras for the game. Thankfully, we can combat a sizeable percentage of these cases with a little education and some much-needed tips, which we'll cover on the next couple of pages.

There are two main schools of thought on the Internet regarding the overspending in an app or game by a child. One view is that it's the fault of parents or guardians, letting their child on the game with unrestricted access to their mobile spending platform.

The other view lies the blame at the feet of the developers and those who have created the app or game. Both have their valid points, and there's no right or wrong, but perhaps the blame lies equally with each.

Tips on How to Stop In-app Overspending

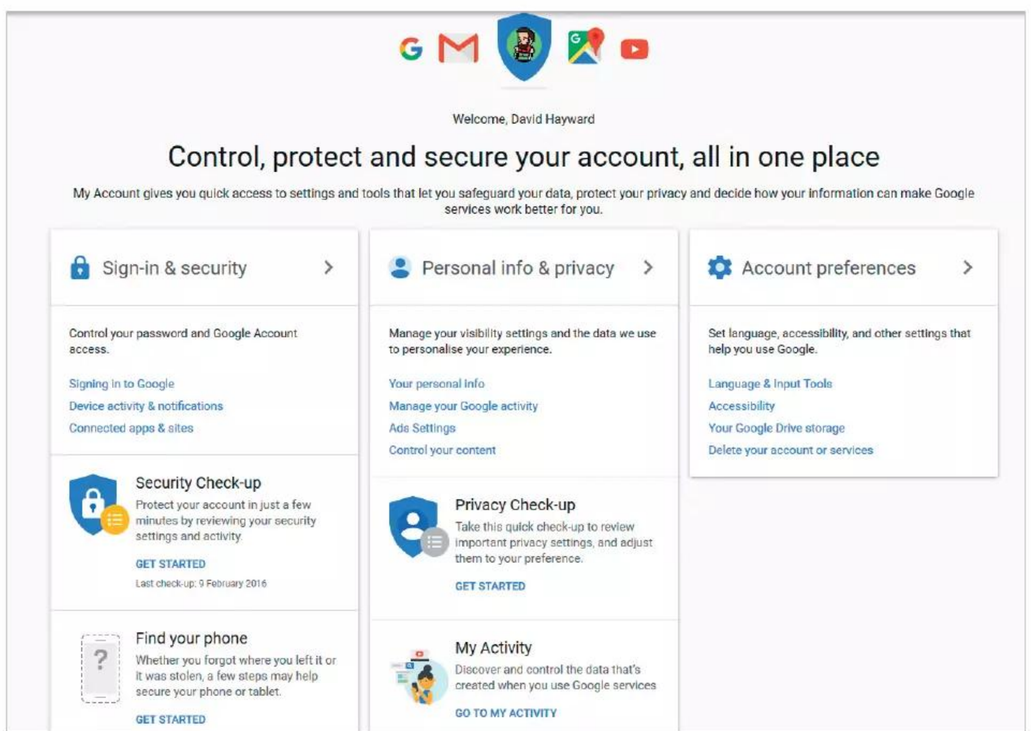
In-app overspending, as we've seen, is a concern for parents and guardians whenever their children use a phone, tablet, console or computer. However, there is a happy middle ground, where the kids can still enjoy their game and the parents needn't worry about in-app purchases.

10 Tips to Stop In-app Purchases

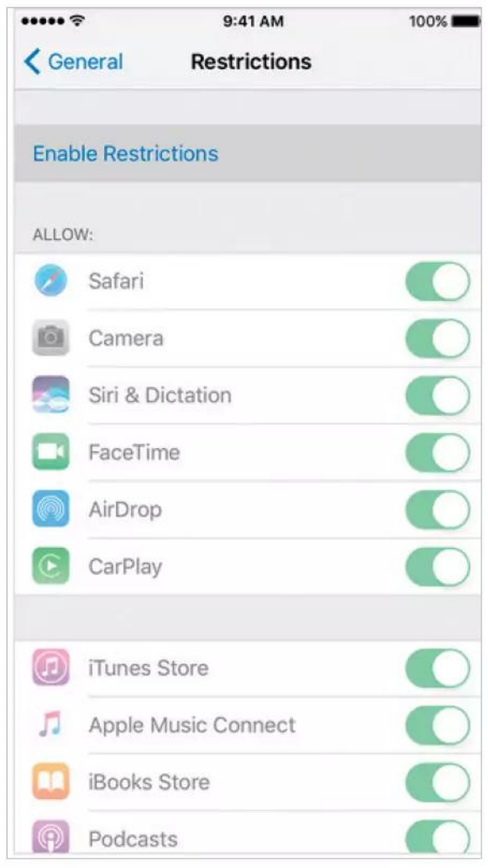
There's nothing wrong with spending money on a game, either to buy it in the first place or just to upgrade a part of it. What's needed though, is a little thought to combat overspending.

TIP 1 The main tip, and one that all child experts agree on, is simply don't leave your child alone with a device, console or computer whilst playing the game. Naturally it depends on the age of the child but essentially it's recommended never to leave a younger child alone, as that's when rogue spending can occur.

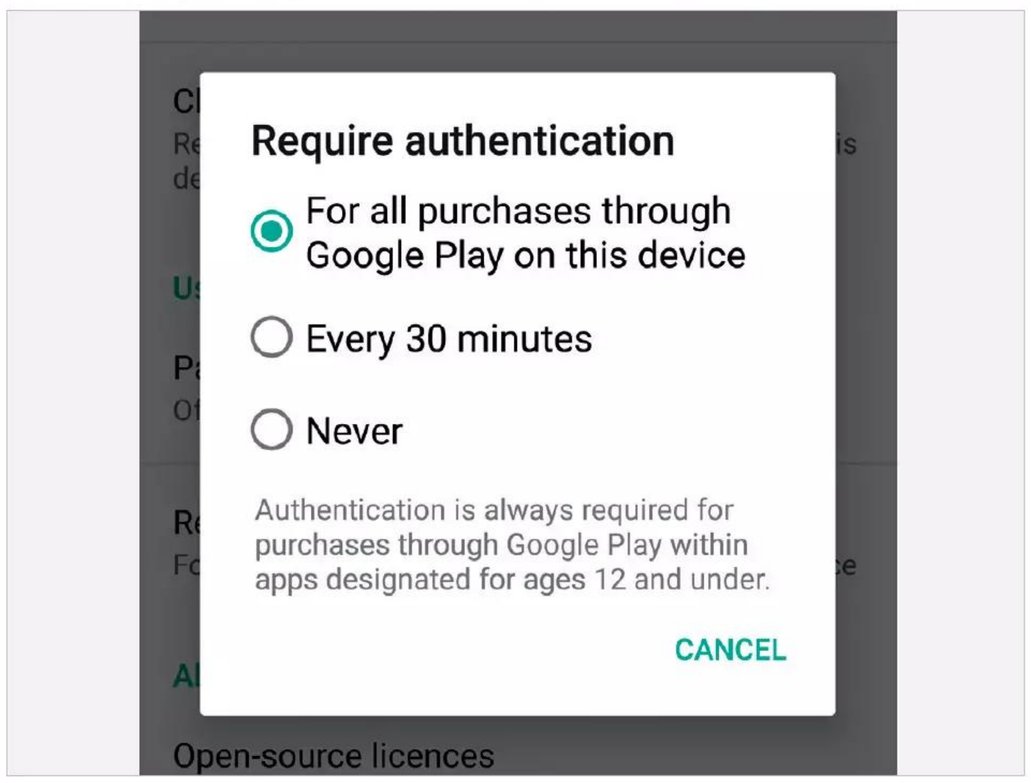
TIP 2 Set up their own account: using a child's account will dramatically cut down on any in-app overspending. Generally speaking, most children won't have access to a bank card to enter into the in-game shop or have access to the family bank details.



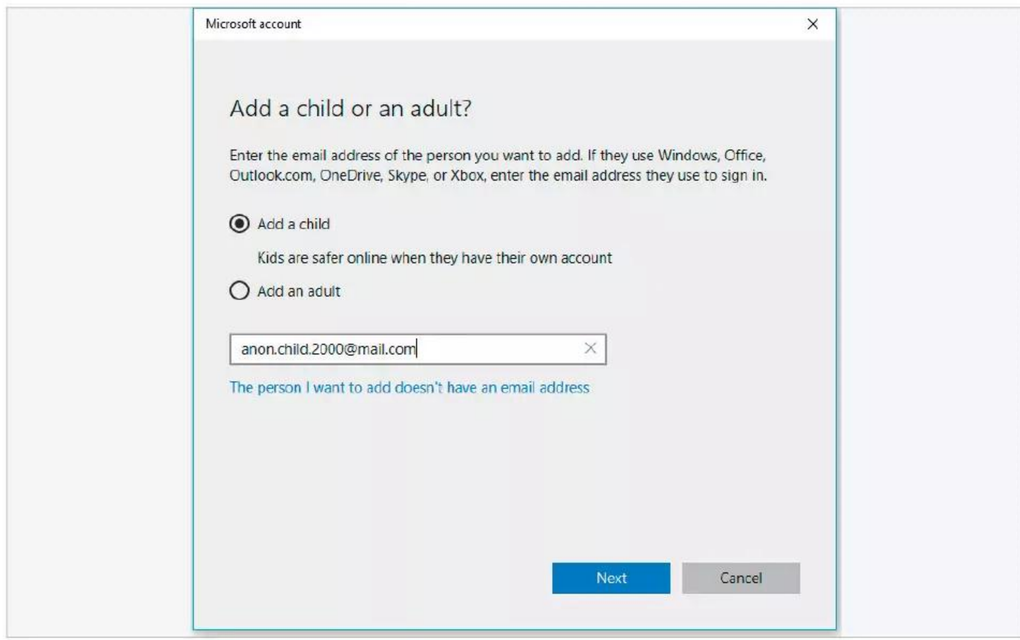
TIP 3 If you're using an iOS device, go to Settings > General > Restrictions and tap to enable the Restrictions. You can now create a passcode to lock out access to the iTunes Store, Safari and other Apple online portals, as well as other Apple apps.



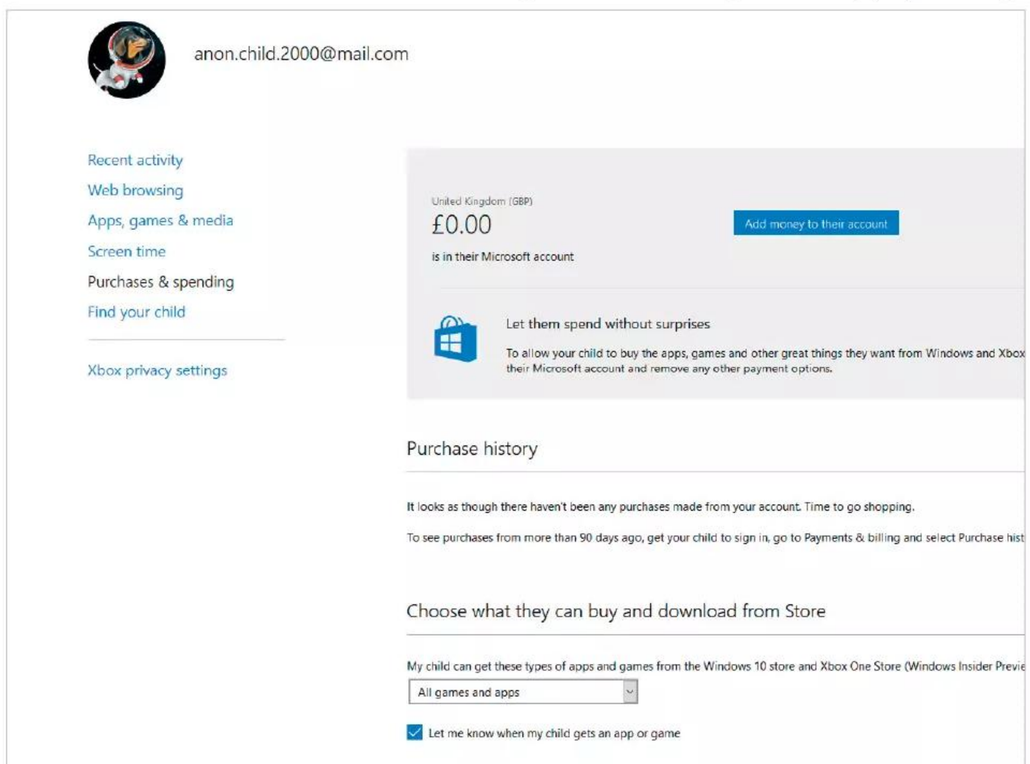
TIP 4 For Google devices, it's best to either never enter your banking details into Google Play or swipe in from the left whilst in the Play Store, choose Settings and tap the Require Authentication for Purchases option.



TIP 5 For Microsoft accounts, use the steps from our previous pages to create a child's account on your Windows device; then use the Microsoft Family portal to restrict access to apps and spending.

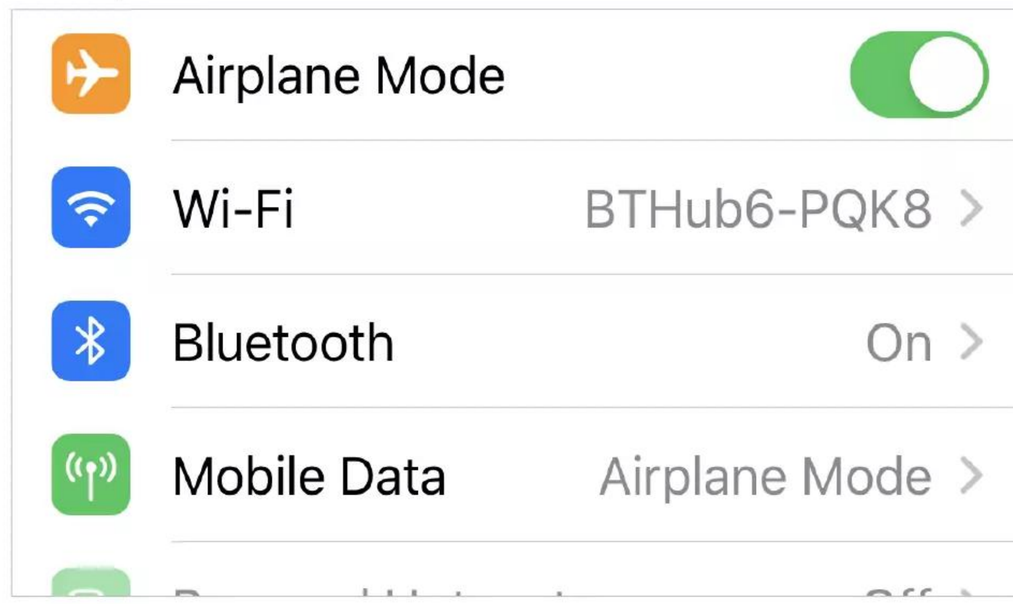


TIP 6 There's nothing wrong with spending money on a game, so why not consider setting up a limited amount of money on a Microsoft account. The child then has to then manage their own budget on in-app spending.

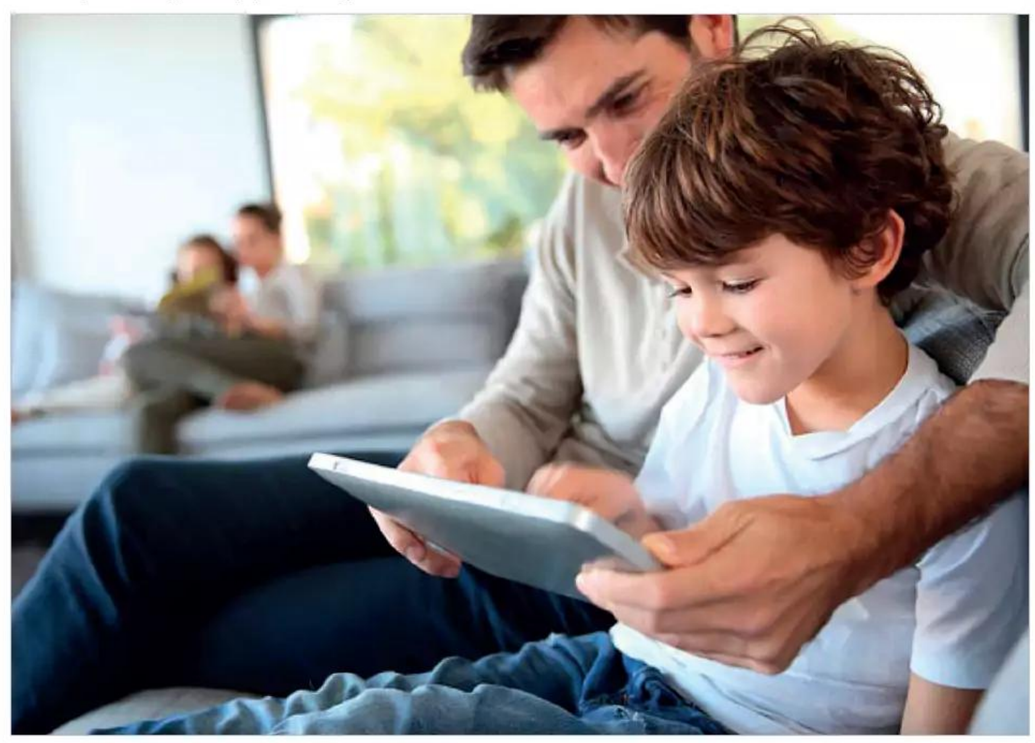


TIP 7 Similarly, consider using a gift card for iTunes or Google Play to allow any in-app spending. This way it's a more controlled purchasing environment and since the child is happy with the bonus app-extras, you're happy with the spending and the developer still gets paid. Everyone is happy with the outcome.

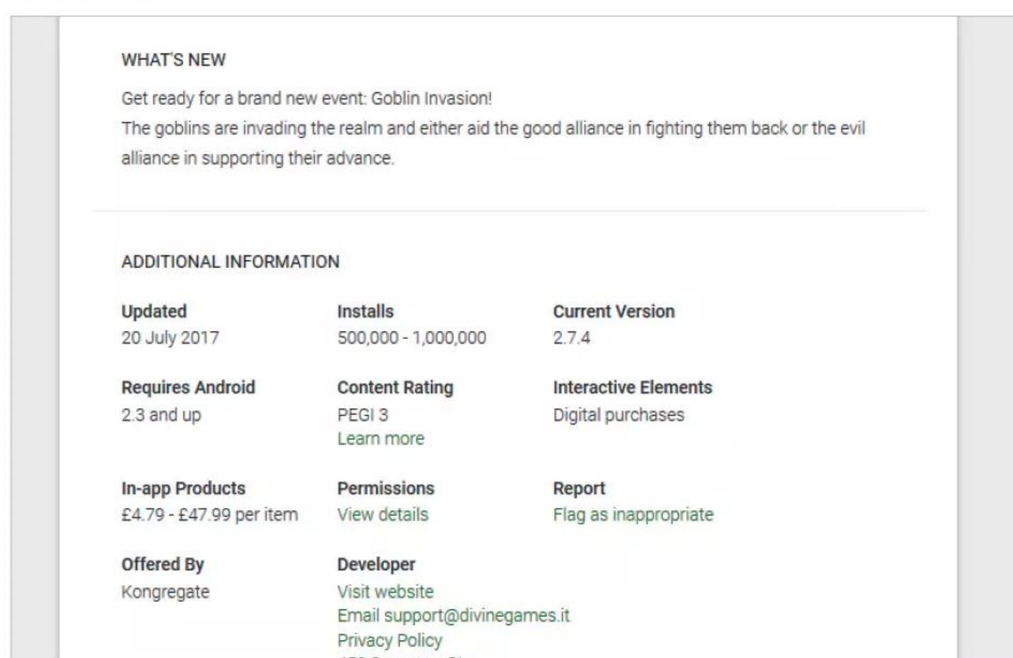
TIP 8 Enabling Airplane mode whilst the child is playing on the device stops any access to online services and thus the in-app or in-game stores. It's not ideal, and it can easily be deactivated, but for younger children it's a valid option.



TIP 9 Talking to your children and taking the time to explain how in-app purchases work, and how bad it can be if they overspend, is a highly recommended option. Child experts state that the best policy to prevent overspending in apps and games is a little education.



TIP 10 Before your child downloads and installs a game or app, take a few moments to look through the app's information to see what, if any, in-app products are on offer. This section will usually inform you of how much money the in-app extras cost and you can then judge whether to allow the install or not.



Online Child Safety at School

Whilst you're doing everything you can at home to ensure your child is safe when online, what happens when they're out of the protection of your home network? Schools are up against as much, if not more, online safety issues as parents.

How does your child's school provide online safety? What tools and procedures do they use? What government backed schemes are available for them?

What's their policy on cyber bullying and what's the process should anything inappropriate ever make its way into the school's network?

Most of those questions are dependent on the school itself and what policies it's created in collaboration with the council, local government, parents, teachers and governing body. In the UK, the UKCCIS (UK Council for Child Internet Safety) has drawn up and developed a guide for school governors to follow, to help governing boards support their school leaders in keeping children safe online. It's an interesting six-page document and further reading can be found with the accompanying Sexting in Schools and Colleges 50-page guidance document. You can find both at *https://www.gov.uk/government/groups/uk-council-for-child-Internet-safety-ukccis*.

From 22 December 2015, the Department for Education put in place strengthened measures to help protect children from harm online, which included cyber bullying, access to pornography and the risks involved with radicalisation. These measures enforced schools to improve or implement better filters and monitoring systems, guides on social media and good practise and the teaching of online threats and the issues surrounding it.

This safeguarding of students through education is one of the best forms of introducing a heightened level of Internet safety amongst young people. Parents and guardians can rant and rave about Internet safety until they are blue in the face but when it comes as part of a lesson in the school, the message is considered to be delivered with a more meaningful impact. In classes, students are taught what Internet use is acceptable, and what isn't and given clear objectives for Internet use. The school is also capable and often required to consult with outside child protection agencies, bringing in experts to help further the student's understanding of the dangers and risks of the Internet, social media and all forms of digital behaviour.

Beyond the classroom talks and conversations, schools employ an assortment of advanced monitoring tools and filters. The school's expert IT staff will already use a range of network level security features found only in the server versions of Windows, or Linux. These features will restrict the students' activities, whilst still offering them access to much needed resources both internally and externally on the Internet. If your child is new to the school, take a moment to ask if you can speak to the head of the school's IT or IT manager and ask them what they use and do to set limits and restrictions on local and Internet resources. Most of the techniques used are quite fascinating, even from a non-technical point of view, and often can be applied to a lesser, but just as effective, degree on the home network.

In addition to protection on the network level, the IT team will also implement a range of site-level Net Nanny-like programs. They may only use a single program, installed on a server to manage each workstation or they may use several programs to manage each student's account; monitoring sites visited and providing blocks for sites that are deemed inappropriate. Another element to consider with a schools' IT is the use of its available bandwidth. With hundreds, often thousands, of devices and computers attached to the school network it can at times become a little slow, as there's limited bandwidth. A school's IT team therefore must also decide whether or not to block access to sites that will cause a strain on the bandwidth, such as online game sites or media streaming. Whilst the students may be blocked from such sites, the teachers are usually unrestricted, for teaching purposes.

These filters, blocked sites and bandwidth monitoring techniques all add up to make an effective protection net around the school's IT infrastructure. It's important to understand, from a parent's point of view, the amount of work needed to achieve such a high degree of online safety and that it can become quite expensive once you factor in licensed software. Where you might have purchased a child filtering product, and employed some of the security techniques we've used in this book, a school IT system needs to do all that times a thousand-plus for each student, computer and device.

Nevertheless, a school's online safety requirements are exceptionally more advanced than you have at home. With this in mind, your child is less likely to experience any online risks when at school than at home. However, it's always best to take the time to make an appointment with the school to ask what they're doing to ensure online safety.

Where to Find Help with Online Child Safety

The tips and features throughout this book will help you build a better understanding of security and online safety, with special reference to online child safety. If you want to know more though, or you have some pressing questions that need answering, here are some places to check out.

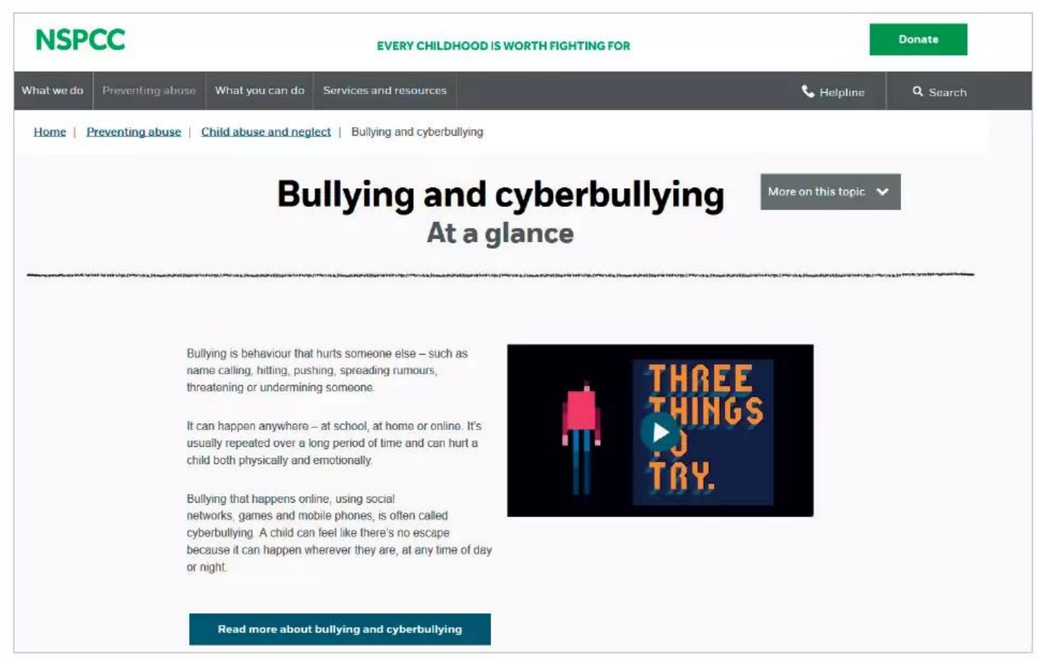
Help is at Hand

For more information, expert advice from child care professionals and more tips on how to protect your child when online, here are ten sites to bookmark and consider.

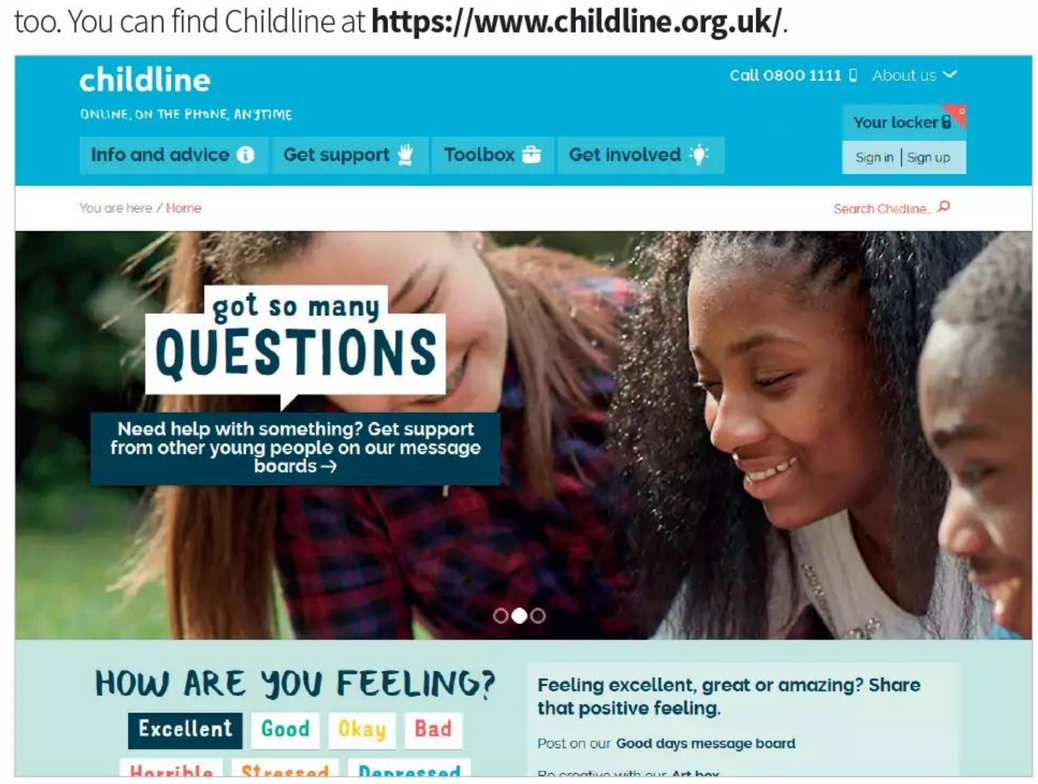
TIP 1 If you'd rather contact a professional child care expert, person to person, then consider contacting your local doctor's surgery and asking for a list of contact details of the child counsellors in the area. Most surgeries will have all the relevant information to hand for you.

TIP 2 Your child's teachers and school welfare officers will have an excellent understanding of how to help keep your child safe when online. They can answer your questions or at least help point you in the right direction.

TIP 3 Regardless of where you are in the world, the UK's NSPCC website contains invaluable information regarding child safety, especially online child safety. You can find the main site at **https://www.nspcc.org.uk/**, with access to services and resources.

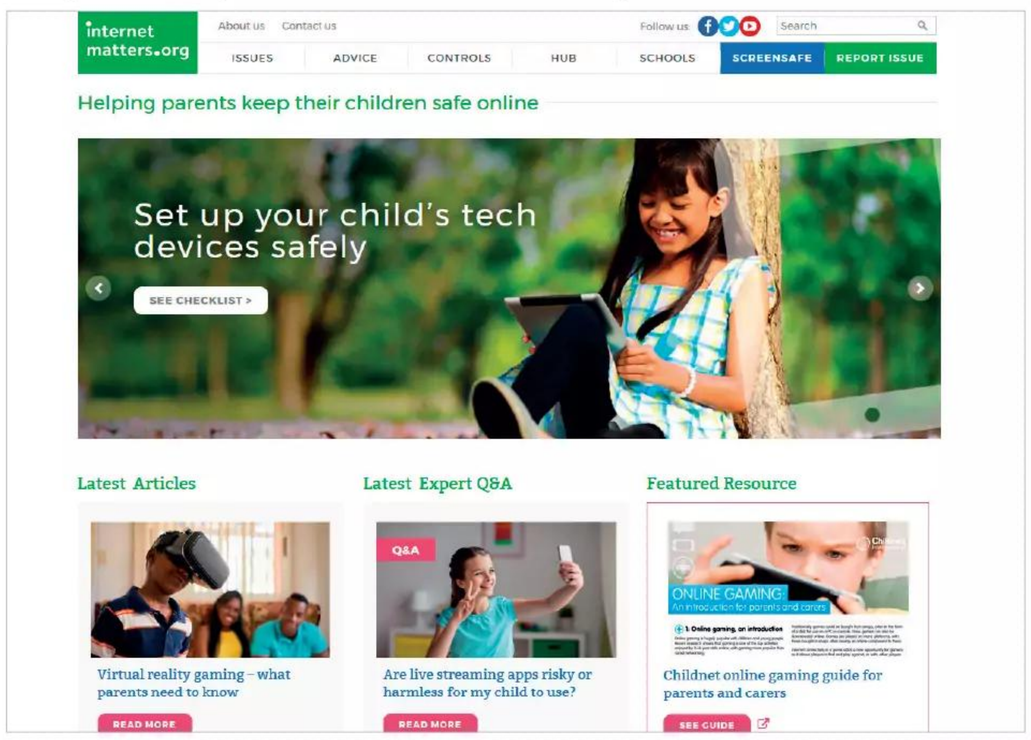


TIP 4 In addition to the NSPCC, the UK's Childline is also an exceptional resource that contains a wealth of information and support for families, parents, guardians and children. There's a superb online safety section too. You can find Childline at **https://www.childline.org.uk/**.



TIP 5 Childnet International is a site dedicated to young people, children, teachers and professionals, parents and carers. There's a ton of resources and support available through the site and plenty of advice about online child safety. Find it at **http://www.childnet.com/**.

TIP 6 Internet Matters features articles, advice, support, guidelines and tips on how to protect your children better when online. There are plenty of resources to hand for children at preschool, all the way up to teenagers at college. It's at **https://www.Internetmatters.org/**.



TIP 7 To expand on the first entry in our list, local support groups are an ideal source of information and tips. Other parents and guardians going through the same considerations as yourself may well be more than happy to share any tips they have.

TIP 8 The American SPCC (Society for the Positive Care of Children) is yet another superb site that details advice on cyber bullying amongst other child protection issues. There's also a list of recommended books for you to look up. You can find the ASPCC at **http://americanspcc.org/**.

TIP 9 There are some excellent resources available on the Get Safe Online website. Here you can find tips, advice and tutorials covering nearly all aspects of online child safety, including emphasis on mobile devices; there's plenty to get through. You can find it all at **https://www.getsafeonline.org/**.

TIP 10 Finally, consider checking out the website of, or visiting, the local police station for more information on online safety. The police have information on area professionals and child safety experts as well as further information on what to do if your child is the victim of an online threat.

What the Experts Say

Our next generation is heading into an ever increasingly connected, digital world. What we perceive as threats now will certainly change in a decade's time, as the technology surrounding us evolves and becomes even more integrated. What will remain important though, is online safety.

"We've gathered together quotes and asked child safety and security experts to have their say on the matter of online safety; as a result, here are ten examples from the professionals"

"Start discussing online safety at an early age."

David Emm, senior security researcher at Internet security company Kaspersky Lab.

"Talking to your child openly and regularly is the best way to help keep them safe online."

NSPCC, Keeping Children Safe Online.

"Follow the same rules you would follow in the real world."

Darren Anstee, director of solutions architects at network security company Arbor Networks.

"Think before you post. Don't upload or share anything you wouldn't want your parents, teachers or friends seeing. Once you press send, it is no longer private. You can't be sure who will end up seeing it"

Childline.

"If you wouldn't do it face to face, don't do it online."

Shelagh McManus, online safety advocate for security software Norton by Symantec.

"Ask them about how they stay safe online. What tips do they have for you, where did they learn them and what is OK and not OK to share"

Childnet, Staying Safe Online.

"You might find it helpful to start with a family discussion, to set boundaries and agree what's appropriate."

NSPCC, Keeping Children Safe Online.

"Don't be pressured to give your number out. If someone is pressuring you into giving them your number, tell someone about it such as a teacher or parent."

Childline.

"Set and monitor limits for the amount of daily or weekly time your children spend online gaming."

Get Safe Online, Safeguarding Children, Gaming.

"Don't meet people you don't know. Even if you get on with them online, you never know who they really are."

Childline.

Glossary of Terms

The bewildering world of technological terms is often difficult even for experts to navigate without becoming slightly confused and we could easily dedicate an entire book just to the glossary. However, here are some of the more important terms from the world of digital security and safety.

Digital Security A-Z

Digital security and safety terms are often as clear as mud. Use this glossary whenever you come across a term you don't understand.

A

Access Control: A term used to ensure that resources are only granted to users who are entitled to them.

Active Content: Code that's embedded in a web site. When the site is accessed the code is automatically downloaded and executed.

Advanced Encryption Standard (AES): An encryption standard designed to specify an unclassified, publicly disclosed, symmetric encryption algorithm.

Asymmetric Cryptography: Public key cryptography, where algorithms use a pair of keys, one public and one private, to unlock the content protected by the encryption.

Authentication: Used by systems to confirm the identity of a user.

B

Backdoor: A tool used by hackers or system security experts to access a computer system or network, bypassing the system's usual security mechanisms.

Bandwidth: The limited amount of communications data that any channel is capable of sending or receiving in a specific time.

Biometrics: A security measure that uses physical characteristics to authenticate a user's access to a system.

Boot Sector Virus: A virus that can affect a computer as it boots, before the operating system has even loaded.

Botnet: A large number of Internet connected, infected computers that are used to flood a network or send spam message to the rest of the Internet.

Brute Force: A hacking technique that uses all possible password combinations one at a time in order to gain access to a user account or system.

C

Cipher: A cryptographic algorithm used in the encryption and decryption process.

Cookie: A file used to store information about a website that can be read should the user ever visit the site again.

Cyber Attack: An attack on a system using malware to compromise its security. Usually in order to gain access to steal information or demand a ransom.

Cyber Bullying: When an individual, or group of individuals, threaten or post negative and derogatory messages or doctored images of someone online.

D

Data Encryption Standard (DES): A popular method of data encryption using a private (secret) key. There are 72,000,000,000,000,000 (72 quadrillion) or more possible encryption keys that can be used.

Decryption: The process of transforming an encrypted message into its original text form.

Demilitarised Zone (DMZ): A demilitarised zone (DMZ) or perimeter network is a network area (a subnetwork) that sits between an organisation's internal network and an external network, usually the Internet. DMZ's help to enable the layered security model in that they provide subnetwork segmentation based on security requirements or policy. DMZ's provide either a transit mechanism from a secure source to an insecure destination or from an insecure source to a more secure destination.

Denial of Service (DoS): Prevention of authorised access to a system or network.

Disaster Recovery Plan (DRP): A plan of action used to restore systems in the event of a disaster.

Distributed Denial of Service (DDoS): A type of DoS attack using multiple attacking systems to amplify the amount of network traffic, thereby flooding and swamping the target systems or networks.

Domain Name System (DNS): The domain name system (DNS) is the way that Internet domain names are located and translated into Internet Protocol addresses. A domain name is a meaningful and easy to remember 'handle' for an Internet address.

E

Encryption: The process of securing data by transforming it into something unreadable using cryptographic means.

Ethernet: Communication architecture for wired local area networks.

F

Fingerprinting: Used by hackers and security experts to send packets to a

system in order to see how it responds, usually to determine the operating system and security measures.

Firewall: A hardware or software layer designed to prevent unauthorised access to or from a computer or network to another computer or network.

Flooding: A malware attack that causes an eventual failure of a system by bombarding it with a continuous stream of data.

G

Gateway: A network point that acts as the door into another network.

H

Hacker: Someone who violates or circumvents a computer security measure. Can be used for malicious purposes or legitimately to test a system's vulnerabilities.

HTTP: Hypertext Transfer Protocol, the protocol used by the World Wide Web (Internet) that defines how messages are sent, received and read by browsers and other connected software layers.

HTTPS: Hypertext Transfer Protocol Secure, an encrypted and far more secure version of HTTP.

I

Internet Protocol Address (IP): A standard used by servers and machines to connect to each other and form an individual identity for each connected device.

Internet Service Provider (ISP): A company that provides Internet access to businesses and residential addresses.

IP Spoofing: A form of attack where a device provides a false IP address to a server or network.

K

Key Logger: A type of malware that can record key presses as a text file and send that file to a remote source. Once obtained, the hacker can then see what keys you've pressed.

L

Local Area Network (LAN): Communications network linking multiple devices in a defined, limited location, such as a home or office.

Logic Bomb: A type of malware that's dormant until a predefined time when it explodes and runs or injects malicious code into a system.

M

Malicious Code: Software that's designed to circumvent security measures and gain unauthorised access to a system.

Malware: A generic term to describe different types of malicious code.

N

Network: A group of linked computers or devices that can share resources and communicate with each other.

P

Password: A secret security measure used to access a protected resource and authenticate access.

Phishing: A method used by cyber criminals to obtain information from a user by baiting them with fake emails or messages.

PIN: Personal Identification Number, used as a form of authentication access to a system, resource or user account.

R

Ransomware: A type of malware that locks, or encrypts, all files on a system until a ransom is paid and the unlock code is entered.

Rootkit: A set of tools used by a hacker to mask their intrusion and obtain administrator access to a system.

S

Sandbox: A system architecture designed to test code in a secure and safe environment without it affecting the host system.

Spoofing: An attempt to gain unauthorised access.

Spyware: A type of malware that spies on a user's activities or system and reports back to a remote system.

T

Trojan Horse: A type of malware designed as a useful program but in reality hides some malicious code.

Two-Factor Authentication: Authorisation of access to a system or resource through a username/ password combination as well as another form of authorisation, such as a PIN code.

V

Virus: A type of malware designed for multiple purposes to spread and infect as many computer systems as possible. Usually destructive but can be used to grind a system to a halt by using up all of its available resources.

VPN: Virtual Private Network, a secure tunnel between two systems using advanced encryption methods to protect the communications between systems.

W

Wi-Fi: A wireless network standard between connected systems.

Worm: A type of malware that can replicate itself and spread through other systems consuming resources and contents destructively.

Z

Zero Day: Described as the day a new security vulnerability is discovered, one that has no fix or patch yet to stop it.

Zombie(s): A computer that's infected with malware and connected to a network or the Internet and used to spread its infection to other computers. Used also to describe an attack on other systems by hoards of zombie computers.

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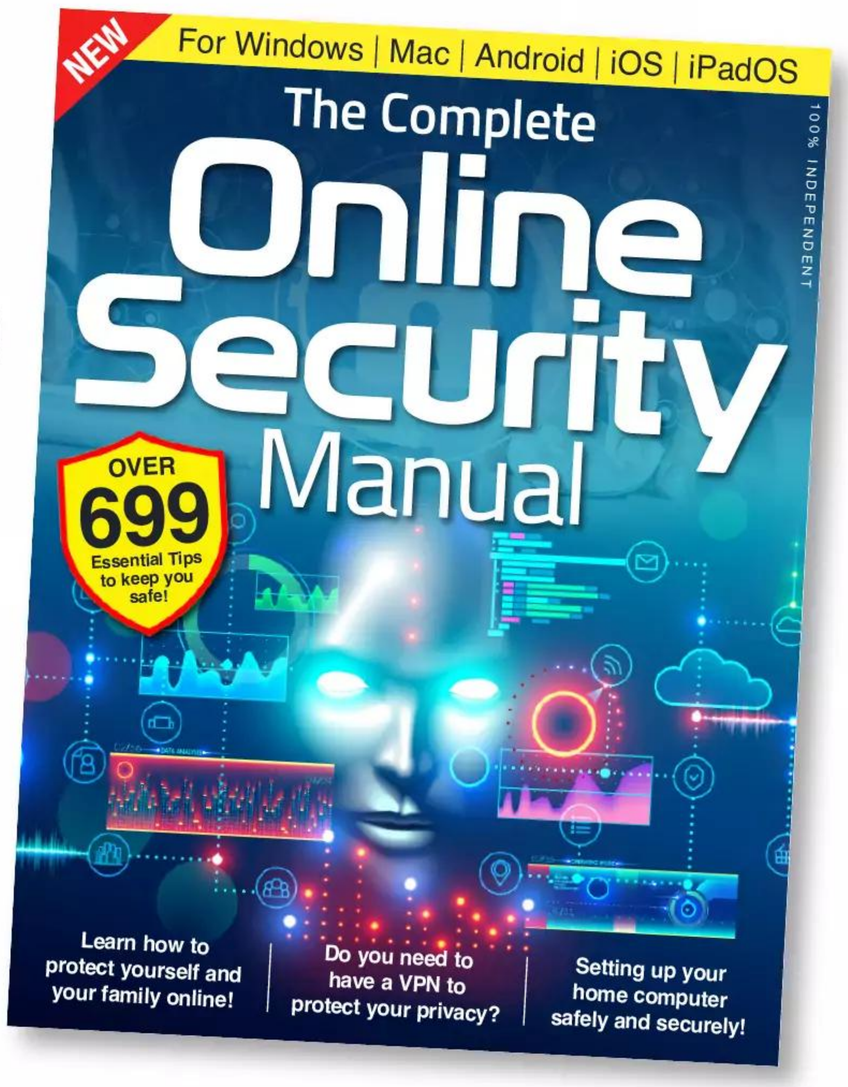

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The Complete Manual Series:
Internet Security
25 | ISBN: 978-1-914404-56-6
Published by: Papercut Limited

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